Appendix F

Methane Report

METHANE REPORT

LOS ANGELES COUNTY MUSEUM OF ART

MUSEUM BUILDING AND OGDEN PARKING STRUCTURE PROJECT

Prepared for:

Museum Associates, dba Los Angeles County Museum of Art

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Introduction

Methane Specialists has prepared this Methane Report for Museum Associates, dba the Los Angeles County Museum of Art ("LACMA") to evaluate the proposed Building for the Permanent Collection Project ("Project") located at 5905 Wilshire Boulevard, Los Angeles California 90036. In partnership with the County of Los Angeles, Museum Associates proposes to construct the Building for the Permanent Collection ("Museum Building") and a separate parking structure ("Ogden Parking Structure") as described below. The site is within the City of Los Angeles Methane Zone as defined by the Los Angeles City Department of Building and Safety. The site is also within 300 feet of an abandoned oil well as defined by the Los Angeles County Title 26 Methane Code.

Objective and Scope

The objective of this report is to describe the potential sub surface hazardous gas conditions at the proposed Project site(s) as they relate to the construction and eventual operation of the methane mitigation systems implemented for the Project. An analysis of the sub surface methane concentrations and pressures has been provided. A review of the regulatory requirements for methane mitigation systems applicable for the Project is included for the City of Los Angeles and the County of Los Angeles, both of which have jurisdiction over portions of the Project. A proposed methane mitigation design strategy consistent with the regulatory agencies requirements is also included.

Project Description

The proposed Project is to include the demolition of the existing Ahmanson, Hammer, Bing and Art of the America's buildings on the LACMA East Campus (north of Wilshire Boulevard, south of 6th Street and east of the vacated portion of Ogden Drive). The new Museum Building will consist of seven semi-transparent Pavilions with a main Exhibition Level elevated above the park. Construction of the Museum Building will include a main "North Entrance" and a basement at the portion of the building north of Wilshire Boulevard. The Museum Building will extend over Wilshire Boulevard to the south to occupy the property at the southeast corner of Wilshire Boulevard and Spaulding Avenue ("Spaulding Lot"). Construction on the Spaulding Lot will include a main "South Entrance" and will also include a partial basement.

The Museum Building will include 66,000 gross square feet of combined below-grade basement space with approximately 387,500 gross square feet of total building area.

As part of the Project, the Ogden Parking Structure will be constructed at an existing vacant lot on the west side of Ogden Drive just south of the corner of Wilshire Boulevard and Ogden Drive (the "Ogden Lot"). The Ogden Parking Structure will include up to two levels of below-grade parking under five levels of parking above grade.

The entire Project site lies within the methane zone defined by the City of Los Angeles Department of Building and Safety. The Museum Building will be permitted under the

jurisdiction of the County of Los Angeles. The Ogden Parking Structure will be permitted under the City of Los Angeles.

Regulatory Requirements

The City of Los Angeles implemented a methane mitigation requirement in 1986 after the explosion of the Ross Dress for Less store. The ordinance defined a methane "potential zone" and a "high potential" zone around the Fairfax district. The 1986 methane ordinance and the protective methane zones were initially confined to an area immediately adjacent to the La Brea Tar Pits area. The methane ordinance was updated in 2003 to include a much larger area of the City of Los Angeles. The current ordinance refers to "Methane and Methane Buffer Zones" instead of the Methane Potential and High Potential Zones. The new Methane Zone overlays the active oil fields in the City of Los Angeles as defined by the Division of Gas and Geothermal Resources (DOGGR). The Methane Buffer zone extends approximately 1000 feet beyond the Methane Zone.

The County of Los Angeles has a similar Methane Mitigation ordinance. The County of Los Angeles' ordinance differs in that they do not use "zones" to define the parcels or projects which are to be required to implement methane mitigation. The County of Los Angeles requires projects or parcels within 300 feet of an abandoned oil well to implement methane mitigation measures and ongoing periodic monitoring oversight.

The Project is unique in that regulatory requirements have been considered for both the County of Los Angeles and the City of Los Angeles. The Museum Building will be permitted under the jurisdiction of the County of Los Angeles. After careful review and analysis of both ordinances and discussions with the County of Los Angeles, the decision has been made to comply with the more stringent of the provisions in both the City and the County methane ordinances as described below for the Museum Building portion of the Project. The Ogden Parking Structure will be permitted under the jurisdiction of the City of Los Angeles and will comply with the City methane ordinance.

Methane Mitigation Design Requirements, City of Los Angeles

City of Los Angeles Ordinance No. 175790 defines the methane mitigation requirements for all projects which fall within the "methane zone" or the "methane buffer zone". The zones have been defined by the City of Los Angeles to include areas of the City which fall within or adjacent to the oil production fields as defined by DOGGR. The ordinance requires that each parcel that falls within the methane or methane buffer zone be evaluated for methane concentration and pressure and certified by an approved testing agency. Upon completion and certification, the highest concentration and pressure measured during the investigation determines the "design level" for the project. The ordinance defines five design levels and corresponding mitigation measures for all sites in the methane and methane buffer zones. Level I is the least stringent escalating to Level V as the most stringent "active" methane mitigation.

Methane Mitigation Design Requirements, County of Los Angeles

The County of Los Angeles requires that any building within 300 feet of an abandoned oil well be protected with a methane gas mitigation system consistent with California Building Code, Volume 1, Title 26 Section(s) 110.3 and 110.4 and the County of Los Angeles *Landfill Gas Assessment and Management Los Angeles Department of Public Works Landfill Gas Protection Policy.* (Exhibit 2). One abandoned oil well was located within 300 feet of the Spaulding Lot development site. Although no other wells were found on or adjacent to the other development sites, the area around the Project and the results of the methane investigation indicates a methane hazard exists and that hazard will be mitigated completely.

Division of Oil, Gas & Geothermal Resources (DOGGR), State of California

DOGGR is a state agency which oversees petroleum and gas wells in the State of California. A review of DOGGR well records has been performed by Methane Specialists specifically for the Project. The review revealed that no documented oil wells exist on any portion of the actual Project areas. However one well was located within 300 feet of the Project (Figure 3). The well is located approximately 165 feet from the Spaulding Street portion of the Project. The well is identified as follows:

API: 03714696

Operator: Wilshire Oil Producers Co. Well number 2

Status: Plugged

Coordinates: 34.061579 / -118.357937

While this well will not impact the Project, the County of Los Angeles' methane code requires that all buildings within 300 feet of an abandoned well be evaluated and a methane mitigation system be designed and installed.

Methane Mitigation Design Approach

As previously stated in this document, both the County ordinance and the City ordinance elements of methane mitigation have been considered for the Museum Building portion of the Project. Analysis of both ordinances reveals the City ordinance is generally the more stringent of the two. Based on the analysis of the ordinance elements and consultation with the County of Los Angeles, it has been determined that compliance with the City of Los Angeles' Methane mitigation ordinance will be followed as a minimum level of methane mitigation, with additional levels of mitigation for the portion of the Project under the County jurisdiction in cases where the County ordinance is more stringent.

Gas Impermeable Liner

The main elements of both the County and City methane codes include gas intrusion protection via a continuous membrane completely encapsulating the slab on grade and below grade portions of the building. The City and the County have "approved" membrane products, a membrane approved by both the City and the County will be selected for use at the Project. The liner assembly will be required to resist methane vapors which may be present. In addition, the liner will also be specified to resist seeping tar and oil as well as the likely presence of ground water.

Venting of Methane Gas

The City and the County have similar requirements in venting methane gas from sub foundation areas. Generally the system consists of horizontal perforated pipes designed to collect and convey methane to vertical risers which extend through the building venting the methane to the atmosphere. The sub surface conditions at the Project site and the surrounding Mid-Wilshire area are unique. Near surface natural seepage of tar and oil are prolific throughout the area. In addition, there is also a high ground water table that exists at approximately eleven feet below current surface grade. The seeping tar and high groundwater combine to make sub surface venting impossible for the Project. Perforated pipes below the foundation for purposes of dewatering and methane gas venting would quickly become overwhelmed with tar, oil and water rendering them useless. In the case of the methane venting the clogged pipes would prevent methane from flowing properly to the vertical vent risers causing methane to become trapped below the foundation. The installation of a dewatering system in a similar manner would also prove to be useless. The infiltration of tar and oil would clog the dewatering pipes likely causing a catastrophic failure of the dewatering system leading to potential water intrusion, structural failure and other unforeseen problems.

In unique situations the City of Los Angeles has a modification process intended to solve design issues described above. This process is defined in section 91.7104.2. Methane Mitigation Systems. The City has approved alternate designs for methane venting and dewatering at three

structures located at the LACMA West Campus (north of Wilshire Boulevard, south of 6th Street, east of Fairfax Avenue, and west of the vacated portion of Ogden Drive) as well as other projects in the vicinity of the Project site. These alternate venting and dewatering systems were installed and have been operating successfully for the approximately 10 years. It is the intent of the owner to provide an alternate design for the Project that would be similar to the systems located on the LACMA West Campus which were previously approved under the City's methane ordinance.

Los Angeles City Methane Design Components

Project Mitigation Design Components

In accordance with the City of Los Angeles Ordinance No. 175790, projects in the Methane Zone must be designed and constructed to the components set forth in the Methane Hazard Mitigation Standard Plan unless alternate systems have been approved by the process of modification. Modification from the Standard plan will be required for the sub-slab venting system, the dewatering system and the mechanical extraction system.

Dewatering System (subject to final Geotechnical Report recommendations)

- Passive System
    - Sub-slab venting system
        - Perforated Horizontal Pipes
        - 4" Gravel Blanket Thickness under impervious membrane
        - 4" Gravel Thickness surrounding horizontal pipes
        - Vent Risers (doubled in quantity for Level 5 Design)
- Active System
    - Sub-slab mechanical extraction system
    - Lowest Occupied Space system
        - Gas Detection System
        - Mechanical Ventilation System
        - Alarms System
    - Control Panel
- Miscellaneous System
    - Trench Dams
    - Conduit or Cable Seal Fittings
    - Additional Vent Risers

Additionally, per the Methane Code, paved areas surrounding this portion above 5,000 square feet in total area must also be mitigated using paving vents. The paving vents must be located every 100 feet in areas where 2' of landscaping is not located directly adjacent to the structure.

Los Angeles County Methane Design Components

Project Mitigation Design Components

In accordance with the County of Los Angeles Title 26 Methane Code, projects located near abandoned gas/oil wells, landfills and other methane gas hazards shall be designed and constructed with the following methane mitigation components:

- A gas control system
    - Passive System
        - Membrane sheeting beneath the structure's slab and foundation
        - Gravel filled ventilation trench system
    - Active System
        - Gas Extraction Well system
        - Air Injection Well system
        - Cut off trenches
- A gas monitoring system
    - Sub-slab monitoring probes
    - Monitoring wells used in conjunction with the active system
- A gas monitoring program
- A contingency plan, and
- A covenant and agreement.

Methane Investigation

A methane investigation was performed at the subject property. The investigation scope of work included the property for the Museum Building. This investigation did not include the property where the Ogden Parking Structure is to be located.

Deep probe sets and shallow probe sets were advanced in accordance with the City of Los Angeles' methane investigation protocol. The results of the investigation resulted in a Level V design level based on elevated concentration of methane exceeding 12,500 parts per million (PPM) of methane by volume. A complete methane investigation report and certification is attached (see Exhibit 3).

Based on the concentrations found during the investigation, the decision was made to not investigate the Spaulding Lot and the Ogden Lot, and instead elect to design the structures on the Spaulding Lot and the Ogden Lot property to a Level V design identical to the Museum Building. This election is in accordance with the City of Los Angeles Ordinance No. 175790 section 91.7104.1 EXCEPTION, *"Site*

testing is not required for buildings designed to the requirements of Site Design Level V as described in Table 71…"

Construction Controls/Precautions

During construction of the Museum Building and Ogden Parking Structure, continuous control systems must be in place to mitigate potential methane hazards. The potential gas located in the subsurface and soil/groundwater can be a hazard to workers and the public. During construction, the following precautions shall be adhered to:

- Safety training for all workers will be required in order to respond to any methane gas hazard.
- Monitoring devices will be in place to alert workers of any potential gas hazard.
- Soil sampling and testing will be provided to ensure worker safety.
- Contingency plans and procedures will be in place in the event of a methane gas alarm.
- Exposure to contaminated soil and groundwater will be limited and phased in order to minimize any potential hazard.
- During excavation, soil removal will be monitored and tested. Contaminated soil will be removed and disposed at a permitted facility.

Cal/OSHA

Federal OSHA requirements are designed to promote worker safety, safety training and workers' right-to-know. OSHA publishes safety and exposure standards by establishing permissible exposure limits (PEL) for a number of airborne chemical contaminants. These PEL's establish the maximum time a worker can be exposed to a chemical contaminant safely during the work day. The PEL standards can be achieved through operational or engineering controls or through the use of the appropriate personal protective equipment.

It is likely that methane and hydrogen sulfide will be encountered during excavation. OSHA does not establish a PEL for methane. There are a number of vapors and gases, when present in high concentrations, that act primarily as asphyxiates without other adverse effects. Methane may present an explosion hazard when allowed to accumulate to the lower explosion limit (LEL). Cal/OSHA establishes regulations over the workplace when a potential explosion hazard may exist. Ventilation of enclosed or confined spaces must be provided in a manner as to not allow methane to exceed 25% of the LEL and no ignition sources may be present indoors or outdoors when the concentrations may reasonably be expected exceed 25% LEL. (Cal/OSHA 2011)

Cal/OSHA establishes a 10 PPM by volume exposure limit for hydrogen sulfide. (State of California Department of industrial relations, Title 8 Table AC1)

Operational Controls

The methane mitigation system will be designed and constructed to meet the Level V Methane Zone Requirements per the City's Methane Mitigation ordinance. The active and passive systems described below will mitigate any potential methane gas found on the site.

1. Beneath Basement slab components
   Both the Los Angeles City Code and the Los Angeles County Code require a methane gas impermeable membrane and sub-slab venting system below the structural slab. The Project site is unique in that flowing tar and oil are both at and/or near the surface in the entire Project area. This poses a challenge in designing a venting system and a dewatering system. The tar flowing below the building will find its way into the vent pipes and the dewatering pipes eventually filling with them with tar and rendering them useless. In the case of the dewatering pipes, a failure of the structure is likely if the dewatering system fails to operate.

   For the reasons stated above, an alternate gas collection system will be designed equivalent to the methane ordinance to manage the unique challenges of the high ground water, and the flowing tar. The alternate system will be submitted to both the City of Los Angeles and the County of Los Angeles as an alternate to the required sub-slab venting and dewatering system. The design will be submitted to the County under the existing ordinance; the design will be submitted to the City along with a modification demonstrating equivalency with the methane ordinance.

   It should be noted that Methane Specialists has successfully designed and secured alternate methane mitigation systems at the LACMA campus over the last eleven years. The City of Los Angeles has reviewed and approved modifications at the LACMA West Campus as well as other similar sites around the City where sub-slab venting and dewatering are not possible or practical. The LACMA structures that were previously approved with similar modifications have been operating normally without incident.

   The specified impervious membrane will serve as a methane gas barrier as well as a waterproofing membrane on the exterior of subterranean walls as well as beneath the concrete basement slab. Additionally, the membrane thickness will be doubled beneath all elevator and sump pits. The membrane specified will also be a material approved by the City of Los Angeles Department of Building and Safety, and the City of Los Angeles Research Report will be provided. Terminations of the methane membrane will be provided in detail in the methane mitigation design as well as shown in Details 2, 3, 4 and 5 of the Methane Standard Plan (Sheet 7). Membrane boots per Detail 5 of the Methane Standard plan shall also be installed for all penetrations through the membrane and

basement slab. Conduit Seals and Trench Dams will be installed per Detail 8 and Detail 16 of the Methane Standard Plan.

2. Above Basement slab components
   The lowest occupied space system components, as outlined in the Methane Standard Plan, will be implemented in the Project's basement level. These components include gas detectors, alarms and an activated mechanical ventilation system. Gas detectors will be spaced per Table 6 of the Methane Standard Plan as well as any enclosed areas, stairwells, and elevator pits/shafts. Mechanical ventilation will operate at a continuous rate of 1 air exchange per hour or at a rate of 4 air exchanges per hour if triggered by the methane gas detectors. If gas concentrations are encountered greater than 25% LEL, the gas detection systems will active audible alarms and visual horn strobes. These alarms along with the required designated signage will alert occupants to evacuate the building in the event of a high gas concentration event.

3. Paved Areas
   Per the Methane Code, paved areas greater than 5,000 square feet within 15 feet of a building's exterior are required to have paving vents (see Detail 13 of the Methane Standard Plan). Per the preliminary structural designs for the Project, the remaining paved area surrounding the portion of the Museum Building on the Spaulding Lot and the Ogden Parking Structure will meet this criterion. To avoid the need for pavement venting, landscaping may be installed at a rate of 2 feet wide adjacent to the building's exterior and covering at least 80% of the building perimeter.

Operations and Maintenance Plan (O&M)

An Operations and Maintenance Plan will be developed in conjunction with the methane mitigation system components. The O & M Plan will outline the respective manufacturers' required service procedures for the gas detection and mechanical ventilation systems. Additionally, the City of Los Angeles Fire Prevention Bureau's Regulations, alarm testing requirements and system certification checklist will also be implemented in the O & M Plan. The Fire Regulations include testing and verification that the gas detection and alarm system is functioning properly. Furthermore, annual inspection of control panels, alarms, sensors, backup power signage and ventilation is required by the Fire Prevention Bureau (LAFD, 2006). The inspection includes compliance with the approved methane mitigation system design as set forth in the Los Angeles Municipal Code Section 57.06.01 (LAMC Section 91.7106).

Also included in the O & M Plan will be the required frequency of calibration of alarm system components. Additional contingency plan components include specific guidelines for future work which may impact the sub-slab ventilation pipes, impervious membrane, and mechanical extraction fans or vent risers. Repairs to the piping and membrane systems will be in accordance with the approved specifications and design plans.

Emergency Plan

Per the requirements of the Methane Standard Plan, an Emergency Plan will be developed in the event of gas detections resulting in emergency situations. The Emergency Plan will include an outline of the required signage and LAFD contact information displayed per the requirements of the Methane Code. Emergency procedures will be visually displayed per the locations designated by the LAFD. The Emergency Plan will also indicate the responsible party to interact with the LAFD in the event of an emergency.

Impact Analysis

Construction

During demolition and construction activity at the Project site, subsurface methane gas and impacted soil/groundwater will affect the Project.

Gas emissions may be encountered during the demolition of the existing buildings and construction of the proposed structure. Methane gas is hazardous and potentially explosive in high concentrations. During all excavation and demolition, any confined spaces are potential areas where hazardous gas can be trapped. Basement areas with no natural ventilation are particularly hazardous.

The disturbance and removal of the soil and groundwater on site containing these potential gas hazards may result in health and safety issues for site workers or any occupants on the project site. Additionally, unregulated transportation or removal of soil or groundwater from this site may result in spreading of the hazardous gas or constituents to areas outside of the Project. Disposal of contaminated soil material will occur at a facility licensed to accept total petroleum hydrocarbons (TPH)-impacted soils.

During the demolition of the existing buildings' basement slab, workers and the public may be exposed to potential hazardous gas. This will be a continuous potential hazard up to, and during the installation of the sub-slab methane mitigation system for the proposed buildings. The methane concentrations that may accumulate during the demolition of the existing buildings and construction of the proposed building may reach the explosive limits. The presence of high temperature or sparks may result in an explosion in any areas with a high methane concentration.

During the construction of the proposed Museum Building basement and the Ogden Parking Structure, it is likely that methane gas concentrations will not accumulate due to the fact that ceiling barriers will not be in place at the time of construction. However, implementation of the Construction Control Project Design Features will ensure the safety of workers and any other potential occupants during demolition and construction.

A site specific hazard communication and mitigation plan as well as a site specific Health and Safety plan will be developed in order to identify potential hazards during each phase of the construction schedule. For purposes of this document the plans will include, but not be limited to, specific hazards related to methane gas and hydrogen sulfide gas. The plan will identify safety training requirements and emergency procedures specific to the project schedule.

Operation

Upon completion of the Project, the occupied Museum Building and Ogden Parking Structure will have minimal gas impacts from the site. The Operational Control Project Design Features as previously described, will ensure the safety of all occupants. Implementation of the methane gas mitigation system in accordance with the Methane Mitigation Ordinance will reduce any hazards associated with any potential methane gas.

References

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, 1998, California Oil and Gas Fields, Volumes I, II and III. Vol. I (1998), Vol. II (1992), Vol. III (1982). 1,472 pp. Salt Lake information pp. 442-447.

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, 2013. DOGGR Online Mapping System (DOMS). http://maps.conservation.ca.gov/doms/ Accesses 1 November 2013.

California Occupational Safety and Health Administration (Cal/OSHA), 2011, Pocket Guide for the Construction Industry, July, 2011.

Cal/OSHA, 2013. Table AC-1, Permissible Exposure Limits for Chemical Contaminants, available at: http://www.dir.ca.gov/title8/5155table_ac1.html

County of Los Angeles Building Code, 2008, (adopting by reference portions of the California Building Code, Volume 1, 2001), Title 26mof the Los Angeles County Code, as amended by Ordinance No. 2002-0076, effective November 1, 2002.

Los Angeles Department of Building and Safety (LADBS), 2003, Ordinance No. 175790, Division 71 Methane Seepage Regulations, Section 91.7103, Map A-20960, dated September 21, 2003.

Los Angeles Fire Department (LAFD), 2006. Chief's Regulation #4 Procedures: Testing of Fire Protection Equipment, Revision 02-28-06.

Los Angeles Municipal Code (LAMC), Building Code, Section 91.106.4.1 Article 1, Buildings [Building Code], Division 1, Administration, Section 91.106.4.1. Permit Issuance.

LAMC, Building Code, Article 1 Buildings [Building Code], Division 71, Methane Seepage Regulations, Section 91.106. Testing, Maintenance and Service

LAMC, Building Code, Division 71, Methane Seepage Regulations, Section 91.107. Emergency Procedures.

Report Exhibits

Exhibit 1 Los Angeles City Methane Ordinance No. 175790

ORDINANCE NO. 175790

An ordinance amending Section 91.106.4.1 and Division 71 of Article 1, Chapter IX of the Los Angeles Municipal Code to establish citywide methane mitigation requirements and include more current construction standards to control methane intrusion into buildings.

WHEREAS, there was a fire in the Fairfax Area of the City of Los Angeles in 1985, due to high volume of methane gas seepage through cracks in the concrete floor of a building;

WHEREAS, the City of Los Angeles adopted an Ordinance, (Ord. No. 161,552, Eff. 8-31-86) which required mitigation for methane gas intrusion into buildings located in the Fairfax area of Los Angeles;

WHEREAS, methane gas which percolates from subsurface geological formations to the atmosphere is a natural phenomenon;

WHEREAS, in 1999, large pockets of methane gas in subsurface geological formations were discovered at the Playa Vista project area of West Los Angeles;

WHEREAS, in 2001, new methane mitigating systems were developed and used in the Playa Vista Project;

WHEREAS, in Council File No. 01-1305, the City Council directed the City=s Departments of Building and Safety, Engineering, and Planning, as well as, the Chief Legislative Analyst and Office of Administrative and Research Services, to form a work group and recommend uniform safety requirements regarding methane, for all future development throughout the City;

WHEREAS, a study by the work group was conducted regarding areas throughout the City of Los Angeles to identify areas where subsurface methane gas may be found;

WHEREAS, from the information and data provided by the Division of Oil, Gas and Geothermal Resources, Department of Conservation, State of California, City of Los Angeles Department of Environmental Affairs, Department of Building and Safety and the Fire Department a map was plotted by the Department of Public Works to show other areas within the City of Los Angeles, where there exists a possible potential hazard of methane gas;

WHEREAS, modern construction standards were successfully used as methane mitigation systems for many projects in Playa Vista;

WHEREAS, the work group utilized the research and knowledge gained through the development of the Playa Vista methane mitigation systems;

WHEREAS, many of the modern construction standards to mitigate potential hazard of methane gas intrusion into building were incorporated into the Los Angeles Municipal Code as more restrictive provisions than found in the 2001 edition of the California Building Code based on local geological conditions;

NOW, THEREFORE,

THE PEOPLE OF THE CITY OF LOS ANGELES
DO ORDAIN AS FOLLOWS:

Section 1. Exception 6 of Section 91.106.4.1 of the Los Angeles Municipal Code is amended to read:

6. The Department shall have the authority to withhold permits on projects located within a Methane Zone or Methane Buffer Zone established under Sections 91.7101 *et seq.* of this Code. Permits may be issued upon submittal of detailed plans that show adequate protection against flammable gas incursion by providing the installation of suitable methane mitigation systems.

Sec. 2. Division 71 of Article 1, Chapter IX of the Los Angeles Municipal Code is amended to read:

DIVISION 71
METHANE SEEPAGE REGULATIONS

SEC. 91.7101. PURPOSE.

This division sets forth the minimum requirements of the City of Los Angeles for control of methane intrusion emanating from geologic formations. The requirements do not regulate flammable vapor that may originate in and propagate from other sources, which include, but are not limited to, ruptured hazardous material transmission lines, underground atmospheric tanks, or similar installations.

SEC. 91.7102. DEFINITIONS.

For the purpose of this division, certain words and phrases are defined as follows:

Alarm System shall mean a group of interacting elements consisting of components and circuits arranged to monitor and annunciate the status of gas concentration levels or supervisory signal-initiating devices and to initiate the appropriate response to those signals.

Buildings with Raised Floor Construction shall mean a building with the bottom of the floor system raised above grade where the clearance for each of the following items shall be at least: 12 inches for the girder, 18 inches for the floor joist and 24 inches for the structural floors.

Cable or Conduit Seal Fitting shall mean an approved fitting provided in a cable or conduit system to prevent the passage of gases, vapors, or flames through electrical cable or conduit.

Design Methane Concentration shall mean the highest concentration of methane gas found during site testing.

Design Methane Pressure shall mean the highest pressure of methane gas found during site testing.

De-watering System shall mean a permanent water removal system, consisting of perforated pipes, gravel, sump pumps and pits, designed to permanently maintain the ground water level one foot below the sub-slab vent system.

Gas Detection System shall mean one or more electrical devices that measure the methane gas concentration and communicate the information to the occupants, building management, central station or alarm company with audible or visual signals.

Gravel Blanket shall mean a layer of gravel, sand, or approved material designed to transmit gas to the vent riser without obstructing the venting system.

Impervious Membrane shall mean a continuous gas barrier made of material approved by the Department and installed beneath a building for the purpose of impeding methane migration to the interior of the building.

Mechanical Extraction System shall mean a system operated by a machine which is designed to remove methane gas from below the impervious membrane through the use of fans, blowers, or other powered devices.

Mechanical Ventilation shall mean a fan, blower or other similar group of interacting elements operated by a machine within the building, which introduce and/or remove air from an enclosed space.

Narrow Building shall mean a building that has a width less than 50 feet, a footprint of less than 50,000 square feet and having a minimum 2-foot wide landscaped area immediately adjacent to the exterior wall for at least 50 percent of the perimeter of the building.

Oil Well shall mean a deep hole or shaft sunk into the earth for the exploration of oil or gas; or which is on lands producing or reasonably presumed to contain oil or gas; or which is drilled for the purpose of injecting fluids or gas for stimulating oil recovery, re-pressurizing or pressure maintenance of oil or gas, or disposing of waste fluids from an oil or gas field.

Perforated Horizontal Pipe shall mean an approved pipe which contains a series of small holes or narrow openings placed equidistant along the length of the approved pipe, which is placed horizontally beneath the foundation of a building, for the purpose of venting accumulated methane gas and preventing the development of elevated gas pressures, or for drainage of ground water to an approved location.

PPMV shall mean Parts per Million by Volume.

Pressure Sensor shall mean a device that measures and communicates surrounding gas pressure to an alarm or control system.

Single Station Gas Detector shall mean a device consisting of electrical components capable of measuring methane gas concentration and initiating an alarm.

Trench Dam shall mean an approved subsurface barrier installed within a furrow or ditch adjacent to the foundation of a building, for the purpose of preventing the migration of methane gas beneath that foundation.

Unobstructed Opening shall mean a permanent clearing or gap in the walls, floors or roof-ceiling assemblies without windows, doors, skylights or other solid barriers that may restrict the flow of air.

Vent Riser shall mean an approved pipe which is placed vertically with joints and fittings connected to Perforated Horizontal Pipes to convey and discharge the gas to the atmosphere.

SEC. 91.7103. GENERAL METHANE MITIGATION REQUIREMENTS.

All new buildings and paved areas located in a Methane Zone or Methane Buffer Zone shall comply with these requirements and the Methane Mitigation Standards established by the Superintendent of Building. The Methane Mitigation Standards provide information describing the installation procedures, design parameters and test protocols for the methane gas mitigation system, which are not set forth in the provisions of this division.

Boundaries of the Methane Zones and Methane Buffer Zones are shown on the AMethane and Methane Buffer Zones Map@ designated as Map number A-20960, dated September 21, 2003, which is attached to Council File No. 01-1305.

SEC. 91.7104. GENERAL METHANE REQUIREMENTS.

91.7104.1. Site Testing. Site testing of subsurface geological formations shall be conducted in accordance with the Methane Mitigation Standards. The site testing shall be conducted under the supervision of a licensed Architect or registered Engineer or Geologist and shall be performed by a testing agency approved by the Department.

The licensed Architect, registered Engineer or Geologist shall indicate in a report to the Department, the testing procedure, the testing instruments used to measure the concentration and pressure of the methane gas. The measurements of the concentration and pressure of the methane gas shall be used to determine the Design Methane Concentration and the Design Methane Pressure. The Design Methane Concentration and the Design Methane Pressure shall determine the Site Design Level of Table 71.

EXCEPTION: Site testing is not required for buildings designed to the requirements of Site Design Level V as described in Table 71, or for buildings designed using the exceptions set forth in Sections 91.7104.3.2 or 91.7104.3.3.

91.7104.2. Methane Mitigation Systems. All buildings located in the Methane Zone and Methane Buffer Zone shall provide a methane mitigation system as required by Table 71 based on the appropriate Site Design Level. The Superintendent of Building may approve an equivalent methane mitigation system designed by an Architect, Engineer or Geologist.

Table 71 prescribes the minimum methane mitigation systems, such as, the passive,

active and miscellaneous systems, depending on the concentration and pressure of the methane present at the site. Each component of the passive, active and miscellaneous systems shall be constructed of an approved material and shall be installed in accordance with the Methane Mitigation Standards.

91.7104.2.1. Passive System. The passive system is a methane mitigation system installed beneath or near the building. The components of the passive system may consist of a de-watering system, the sub-slab vent system, and impervious membrane. The sub-slab vent system shall consist of Perforated Horizontal Pipes, Vent Risers, and Gravel Blankets for the purpose of collecting and conveying methane from the soil underneath the building to the atmosphere.

91.7104.2.1.1. De-watering System. The de-watering system is used to lower the ground water table to a level more than 12 inches below the bottom of the Perforated Horizontal Pipes. The de-watering system shall conduct ground water to an approved location.

91.7104.2.2. Active System. The components of the active system shall consist of one or more of the following, sub-slab system, gas detection system, mechanical ventilation, alarm system and control panel. All components shall be constructed of an approved material, installed in accordance with the Methane Mitigation Standards.

91.7104.2.3. Miscellaneous System. The components of the miscellaneous system may consist of Trench Dam, Cable or Conduit Seal Fitting, or Additional Vent Risers. The component of the miscellaneous system shall be a material approved by the Department and shall be installed in accordance with the Methane Mitigation Standards.

91.7104.3. Exceptions to Table 71. The provisions of this section are exceptions to the construction requirements of Table 71.

91.7104.3.1. Narrow Buildings. Narrow Buildings may substitute Pressure Sensors below the Impervious Membrane in lieu of the Gas Detection System and Mechanical Ventilation, if the installation of the Pressure Sensors below the Impervious Membrane is not required per Table 71 and the Narrow Building is constructed with a minimum two feet wide landscaped area covering at least 50 percent of the ground immediately adjacent to the exterior building walls.

91.7104.3.2. Buildings with Raised Floor Construction. If a Building with Raised Floor Construction has underfloor ventilation construction in accordance with the standards below, then the utilities shall be installed with Trench Dams and Cable or Conduit Seal Fittings and a four inch thick gravel blanket shall be installed under and around the elevator pits.

Underfloor ventilation shall be provided by an approved mechanical ventilation system capable of exhausting underfloor air an equivalent of every 20 minutes, or by openings in the underfloor area complying with the following:

A. The top of the openings shall be located not more than 12 inches below the bottom of the floor joists.

B. The openings shall be distributed approximately equally and located to provide cross ventilation, for example, by locating the opening along the length of at least two opposite sides of the building.

C. The openings shall be the larger of:

1. Openings of not less than 1.5 square feet for each 25 linear feet or fraction of exterior wall; or

2. Openings shall be equal to 1 percent of underfloor area.

D. The openings may be covered with corrosion-resistant wire mesh with mesh openings of greater than 3 inch and less than 2 inch in dimension.

91.7104.3.3. Buildings with Natural Ventilation. A building with natural ventilation is a building constructed with the following:

A. The Unobstructed Openings shall exchange outside air.

B. The size of the Unobstructed Opening shall be the larger of:

1. Opening equal to at least 25 percent of the total perimeter wall area of the lowest level of the building, or

2. Opening equal to at least 25 percent of the floor area of the lowest level of the building.

C. The Unobstructed Openings shall be evenly distributed and located within the upper portion of at least two opposite exterior walls of the lowest level of the building.

Buildings with natural ventilation that are constructed as described above, shall have the utilities constructed with Trench Dams and Cable or Conduit Seal Fittings. If there is an enclosed room or space less than 150 square feet within the building, then the enclosed room or space shall be constructed with vent openings

that comply with the requirements of Section 91.7104.3.4.

91.7104.3.4. Enclosed Room or Space within Building. Individual enclosed rooms or enclosed spaces with floor area less than 2,000 square feet may be exempt from providing the Active System as required by Table 71, provided the vent openings comply with all of the following:

1. Vent openings are Unobstructed Openings, except screens made with at least 3 inch mesh or wind driven turbines on the roof shall be permitted.

2. The aggregate size of vent openings shall be the larger of either five percent of the total floor area of the room or the area of enclosed space, or ten percent of the area of walls on the perimeter of the room or enclosed space.

3. The vent openings shall be located to prevent the accumulation of methane gases within the room or enclosed space.

4. The top of the vent opening shall be located not more than 12 inches below roof joists or ceiling joists if located in a wall of a building.

5. The vent openings shall be located on either two opposite walls or two adjacent walls of the room or enclosed space if located in a wall of a building.

6. The vent openings shall be located no more than 50 feet from any point within the room or enclosed space.

7. When using wind driven turbine, the area of the vent opening shall be calculated by the area of the opening at the attachment of the wind driven turbine at the roof.

8. When the vent opening is located in a wall of an adjoining room, then the adjoining room shall be constructed of either an Active System, or have Natural Ventilation as described in Section 91.7104.3.3.

91.7104.3.5. Single Family Dwelling. Single Family Dwellings and buildings accessory to single family dwellings shall comply with all the Methane Mitigation requirements of Table 71, except that the following mitigation system may be substituted:

A. Pressure Sensors below Impervious Membrane may be installed in lieu of

Gas Detection System when Pressure Sensors below Impervious Membrane is not required; or

B. Single Station Gas Detectors with battery back-up may be installed in lieu of Alarm System and Gas Detection System; or

C. 6 mil thick Visquene may be used in lieu of Impervious Membrane, when the Site Design Levels are I or II; or

D. Additional Vent Risers or Mechanical Ventilation may be omitted for buildings with width less than 50 feet and footprint less than 6,000 square feet in area; or

E. Vent Risers may be substituted in lieu of Mechanical Extraction System, provided the Vent Risers are designed at a rate twice that established by the Methane Mitigation Standards.

91.7104.3.6. Buildings Located in the Methane Buffer Zone. A building, located entirely or partially in the Methane Buffer Zone, shall be designed to the requirements of the Methane Buffer Zone. Buildings located in the Methane Buffer Zone shall not be required to provide any methane mitigation system, if the Design Methane Pressure is less than or equal to two inches of water pressure and is either of the following:

A. Areas which qualify as Site Design Level I or II; or

B. Areas which qualify as Site Design Level III and the utilities are installed with Trench Dams and Cable or Conduit Seal Fitting.

91.7104.3.7. De-watering System. A De-watering system is not required for either of the following:

A. If during the site testing, the groundwater level is deeper than 10 feet below the Perforated Horizontal Pipes, or

B. If the soil investigation or analysis, as approved by the Department, reveals the groundwater level is more than 12 inches below the bottom of the Perforated Horizontal Pipes.

91.7104.3.8. Buildings Located in the First Phase Playa Vista Project. The First Phase Playa Vista project, as approved by the City on September 21, 1993 and December 8, 1995, shall comply with the methane mitigation program as required by the Department pursuant to the Methane Prevention, Detection and Monitoring Program approved by the Department on January 31, 2001, in lieu of the requirements of this

division.

91.7104.4. Paved Areas. Paved areas that are over 5,000 square feet in area and within 15 feet of the exterior wall of a commercial, industrial, institutional or residential building, shall be vented in accordance with the Methane Mitigation Standards.

EXCEPTION: Paved areas located in the Methane Buffer Zone and which qualify for Site Design Levels I, II or III.

SEC. 91.7105. EXISTING BUILDINGS.

Additions, alterations, repairs, changes of use or changes of occupancy to existing buildings shall comply with the methane mitigation requirements of Sections 91.7104.1 and 91.7104.2, when required by Divisions 34, 81 or 82 of this Code.

Approved methane mitigation systems in existing buildings shall be maintained in accordance with Section 91.7106.

SEC. 91.7106. TESTING, MAINTENANCE AND SERVICE OF GAS- DETECTION AND MECHANICAL VENTILATION SYSTEMS.

All gas detection and mechanical ventilation systems shall be maintained and serviced in proper working condition and meet all requirements of the Electrical and Mechanical Code. The testing, maintenance and service procedure for each gasBdetection and mechanical ventilation systems shall be performed in accordance with the manufacturer=s current written instructions and the following:

A. Fire Department. The manufacturer=s instructions shall be approved by the Fire Department. Testing and servicing of each system shall be performed by a person certified by the Fire Department.

B. Notification Placard. A permanent notification placard shall be posted and maintained at the front entrance of a building that is constructed with Impervious Membrane, except in residential buildings. The placard shall indicate the presence of the Impervious Membrane.

SEC. 91.7107. EMERGENCY PROCEDURES.

With the exception of single-family dwellings, all buildings required by this division to have a gas-detection system or sub-slab vent system shall, subject to Fire Department approval, have established emergency procedures that include, but are not limited to, the following:

A. Assignment of a responsible person as safety director to work with the Fire Department in the establishment, implementation and maintenance of an emergency plan.

B. Conspicuous posting of the Fire Department=s telephone number in areas designated by the Fire Department.

C. Conspicuous posting of emergency plan procedures approved by the Fire Department.

SEC. 91.7108. APPLICATION OF METHANE SEEPAGE REGULATIONS TO LOCATIONS OR AREAS OUTSIDE THE METHANE ZONE AND METHANE BUFFER ZONE BOUNDARIES.

Upon a determination by the Department of Building and Safety that a hazard may exist from methane intrusion at a geographical location or in an area outside the boundaries established in Section 91.7103 of this Code, the Department of Building and Safety and the Fire Department may enforce any or all of the requirements of Division 71 of this Code as required to preclude potential fire or explosion from methane concentration.

SEC. 91.7109. ADDITIONAL REMEDIAL MEASURES.

91.7109.1. General Remedial Measures. In the event the concentration of methane gas in any building located in a Methane Zone or Methane Buffer Zone reaches or exceeds 25 percent of the minimum concentration of gas that will form an ignitable mixture with air at ambient temperature and pressure, the owner shall hire an engineer to investigate, recommend and implement mitigating measures. These measures shall be subject to approval of this Department and the Fire Department.

91.7109.2. Abandoned Oil Well. Any abandoned oil well encountered during construction shall be evaluated by the Fire Department and may be required to be re-abandoned in accordance with applicable rules and regulations of the Division of Oil, Gas and Geothermal Resources of the State of California. Buildings shall comply with these provisions and the requirements of Section 91.6105 of this Code, whichever is more restrictive.

TABLE 71. MINIMUM METHANE MITIGATION REQUIREMENTS.

Site Design Level			LEVEL I		LEVEL II		LEVEL III		LEVEL IV		LEVEL V
Design Methane Concentration (ppmv)			0-100		101-1,000		1,001-5,000		5,001-12,500		>12,500
Design Methane Pressure (inches of water pressure)			• 2	>2	• 2	>2	• 2	>2	• 2	>2	All Pressures
PASSIVE SYSTEM	De-watering System [1]		X	X	X	X	X	X	X	X	X
	Sub-Slab Vent System	Perforated Horizontal Pipes	X	X	X	X	X	X	X	X	X
		Gravel Blanket Thickness Under Impervious Membrane	2"	2"	2"	3"	2"	3"	2"	4"	4"
		Gravel Thickness Surrounding Perforated Horizontal Pipes	2"	2"	2"	3"	2"	3"	2"	4"	4"
		Vent Risers	X	X	X	X	X	X	X	X	X
	Impervious Membrane		X	X	X	X	X	X	X	X	X
ACTIVE SYSTEM	Sub-Slab System	Pressure Sensors Below Impervious Membrane								X	X
		Mechanical Extraction System [2]								X	X
	Lowest Occupied Space System	Gas Detection System [3]		X		X	X	X	X	X	X
		Mechanical Ventilation [3, 4, 5]		X		X	X	X	X	X	X
		Alarm System		X		X	X	X	X	X	X
	Control Panel			X		X	X	X	X	X	X
MISC. SYSTEM	Trench Dam		X	X	X	X	X	X	X	X	X
	Conduit or Cable Seal Fitting		X	X	X	X	X	X	X	X	X
	Additional Vent Risers [6]										X

X = Indicates a Required Mitigation Component

1. See Section 91.7104.3.7 for exception.
2. The Mechanical Extraction System shall be capable of providing an equivalent of a complete change of air every 20 minutes of the total volume of the Gravel Blanket.
3. See Section 91.7104.3.1 for Narrow Buildings.

4. The Mechanical Ventilation systems shall be capable of providing an equivalent of one complete change of the lowest occupied space air every 15 minutes.
5. Vent opening complying with Section 91.7104.3.4 may be used in lieu of mechanical ventilation.
6. The total quantity of installed Vent Risers shall be increased to double the rate for the Passive System.

Sec. 3. The City Clerk shall certify to the passage of this ordinance and have it published in accordance with Council policy, either in a daily newspaper circulated in the City of Los Angeles or by posting for ten days in three public places in the City of Los Angeles: one copy on the bulletin board located in the Main Street lobby to the City Hall; one copy on the bulletin board located at the ground level at the Los Angeles Street entrance to the Los Angeles Police Department; and one copy on the bulletin board located at the Temple Street entrance to the Los Angeles County Hall of Records.

I hereby certify that this ordinance was passed by the Council of the City of Los Angeles, at its meeting of February 12, 2004.

J. MICHAEL CAREY, City Clerk
By Maria Kostrencich, Deputy
Approved February 12, 2004
JAMES K. HAHN, Mayor
Approved as to Form and Legality
January 8, 2004
Rockard J. Delgadillo, City Attorney
By Sharon Siedorf Cardenas
Assistant City Attorney
C.F. 01-1305

EFFECTIVE DATE: 3-29-04

METHANE HAZARD MITIGATION STANDARD PLAN

I. PURPOSE

This Methane Hazard Mitigation Standard Plan provides standard details and specifications that maybe used to comply with the requirements of the Methane Seepage Regulations of Division 71 of the Los Angeles Building Code. The intent of methane mitigation systems described in this plan is to promote public safety and welfare by controlling methane intrusion emanating from geologic formations. These systems are not intended to regulate flammable vapors that may originate in and propagate from other sources, which include, but are not limited to, ruptured hazardous material transmission lines, underground atmospheric tanks, or similar installations.

II. HOW TO USE THIS STANDARD PLAN

To use this Standard Plan select either of the following:

1. Avoid Methane Soils Gas Site Testing and construct components for Site Design Level V shown on Tables 1A (Methane Zone) or 1B (Methane Buffer Zone) on Sheet 4.
2. Avoid Methane Soil Gas Site Testing by designing the building using one of the exceptions to Table 1A or 1B under Section IV B 1, 2 or 3 of this Standard Plan.
3. Conduct Methane Soils gas testing, complete Form 1 on sheet 3, and construct components listed in Tables 1A or 1B on Sheet 4.

NOTE: Identify the required Methane Hazard Mitigation components with a "circle" around the appropriate exception under Section IV B (Sheet 1) or the respective column in Tables 1A or 1B (Sheet 4).

III. GENERAL REQUIREMENTS

CODES:
All work shall be in compliance with the current version of the Los Angeles Building Code and policies of the Department of Building and Safety, and all applicable County, State, and Federal Codes.

INSPECTION:
All work, requiring inspection by the Department of Building and Safety, shall be available to the inspector prior to being covered by subsequent work.

IV. MITIGATION REQUIREMENTS

A. NEW BUILDINGS

All new buildings and paved areas located in a Methane Zone or Methane Buffer Zone shall comply with this Standard Plan and Division 71 of the Building Code.

B. EXCEPTIONS TO TABLE 1A and 1B

The provisions of the Building Code, Section 7104.3 are exceptions to the construction requirements of Table 1A and 1B based on the configuration of the building construction. The following exceptions may be used in lieu of full compliance with Tables 1A and 1B. For further information regarding the design of methane mitigation components, see Section V of this Standard Plan.

1. Buildings with Raised Floor Construction.

   Provide all of the following methane mitigation components in lieu of the requirements in Table 1A and 1B.

   a. The utilities shall be installed with Trench Dams, Detail 16 on Sheet 8, and Cable or Conduit Seal Fittings, Detail 8 on Sheet 7.

   b. Four inch (4") thick gravel blanket shall be installed under and around the elevator pits, when there is an elevator pit constructed in the building.

   c. In lieu of the underfloor ventilation requirements of The Building Code, Section 7104.3.2, the underfloor ventilation shall be provided using all of the following:

      i. An approved mechanical ventilation system which is equivalent to providing one complete air change in the underfloor space once every 20 minutes, or

      ii. An under-floor system with a clear height above grade of at least 12 inches to girder, 18 inches to floor joist, and 24 inches to structural floors.

      iii. Openings for underfloor area or crawl space ventilation shall be located less than 6 inches below the bottom of the floor joists. The openings shall be located to provide cross ventilation and shall be the larger of:

         Openings of not less than 1.5 square feet for each 25 linear feet of exterior wall; or

         Openings shall be 1% of underfloor area.

      iv. Openings for underfloor area or crawl space ventilation shall be approximately equally distributed along the length of at least two opposite sides of the building. They shall be covered with corrosion- resistant wire mesh with mesh openings not less than ¼ inch nor greater than ½ inch in dimension.

2. Buildings with Natural Ventilation

   a. Buildings with Natural Ventilation are buildings with Unobstructed Openings or an opening with a wind-assisted system in exterior walls. Unobstructed Openings for Natural Ventilation shall be evenly spaced to prevent the accumulation of methane gases within the building and shall be constructed as follows:

      i. Unobstructed Openings shall be permanently affixed in the open position.

      ii. Unobstructed Openings shall be free of obstructions, except for screens of wire mesh with not less than ¼", or wind driven turbines.

      iii. The aggregate size of Unobstructed Openings providing Natural Ventilation for an enclosed space shall be the larger of:

         25% of total floor area of the lowest level of the building, or

         25% of the total perimeter wall area of the lowest level of the building.

      iv. Unobstructed Openings shall be located in walls or roofs to facilitate natural venting of methane gas to the atmosphere.

      v. Locate uniformly distributed Unobstructed Openings on two or more exterior sides to provide cross ventilation as close to corners as practical.

      vi. Unobstructed Openings shall comply with the provisions of the Los Angeles Building Code including location on property, openings adjacent to stairways and courts.

         a maximum of 6 inches below roof or ceiling joists in the space to be ventilated,

         no more than 50 feet from any point within the building and

         to provide cross ventilation utilizing either of the following:

         1. two opposing sides of the building or space to provide cross ventilation.
         2. two adjacent sides where at least 50% of the required area of vents are centered a distance of one half the diagonal of the space being ventilated.

      vii. Unobstructed Openings in walls shall be located:

         to remove gases from the highest point in the room or enclosed space,

         at a minimum of two positions a maximum of 50 feet on center and

         evenly distributed throughout the enclosed space.

   b. In lieu of the requirements of Table 1A and 1B, buildings with Natural Ventilation, such as, restrooms, gazebos, barns, attendant stations and other similar accessory buildings located in parks or buildings with lowest levels closest to grade having Group S, Division 2 occupancy, or detached buildings of Group U and Unenclosed Buildings shall be constructed with utilities installed with Trench Dams and either Conduit Seal Fittings or Cable Seals Fittings.

3. Enclosed Rooms or Spaces within Building.

   Individual enclosed rooms or enclosed spaces with floor area less than 2,000 square feet maybe exempt from providing the Active System as required by Table 1A and 1B, provided the vent openings comply with all of the following:

   a. Vent openings are Unobstructed Openings, except screens of wire mesh at least ¼ inch or wind driven turbines on the roof shall be permitted.

   b. The aggregate size of vent openings shall be the larger of either five percent of the total floor area of the room or the area of enclosed space, or ten percent of the area of walls on the perimeter of the room or enclosed space.

   c. The vent openings shall be located to prevent the accumulation of methane gases within the room or enclosed space.

   d. The top of the vent opening shall be located not more than 12 inches below roof joists or ceiling joists if located in a wall of a building.

   e. The vent openings shall be located on either two opposite walls or two adjacent walls of the room or enclosed space if located in a wall of a building.

   f. The vent openings shall be located no more than 50 feet from any point within the room or enclosed space.

   g. When using wind driven turbine, the area of the vent opening shall be calculated by the area of the opening at the attachment of the wind driven turbine at the roof.

   h. When the vent opening is located in a wall of an adjoining room, then the adjoining room shall be constructed of either an Active System, or have Natural Ventilation as described in Subsection 2 above (Buildings with Natural Ventilation.)

4. Single Family Dwellings and Buildings Accessory to Single Family Dwellings, some or all of the following may be used in lieu of the requirements of Table 1A and 1B:

   a. Single-Station Gas Detectors with battery-back up may be installed in lieu of an Alarm System and Gas Detection System. The battery shall be sized to operate the Single-Station Gas Detectors at least 20 hours in standby mode and 5 minutes in the alarm mode.

   b. 6-mil thick Visquene may be used in lieu of an Impervious Membrane, when the site is located in the Methane Zone with Site Design Levels I or II.

   c. Additional Vent Risers or Mechanical Ventilation may be omitted for buildings with a width less than 50 feet and footprints less than 6,000 square feet in area.

   d. Vent Risers provided at a rate twice shown in Table 2 on Sheet 4 may be provided in lieu of a Mechanical Extraction System.

5. Buildings Located in the First Phase Playa Vista Project. The First Phase Playa Vista project, as approved by the City on September 21, 1993 and December 8, 1995, shall comply with the methane mitigation program as required by the Department pursuant to the Methane Prevention, Detection and Monitoring Program approved by the Department on January 31, 2001, in lieu of the requirements of the Building Code, Division 71.

C. NOTIFICATION PLACARD

1. A permanent notification placard is required to indicate the presence of the Impervious Membrane.
2. The notification placard shall be posted and maintained at the front of the building that is constructed with an Impervious Membrane, except that in residential buildings.
3. The notification placard shall be uncovered and located in conspicuous location. When cast in floors, shall also remain uncovered and in a conspicuous location.
4. The lettering shall be legible from 10 feet away and at least 1 inch high.

D. PAVED AREAS

The requirements for venting paved areas over 5,000 square feet in area and within 15 feet of the exterior wall of a commercial, industrial, institutional or residential building may be accomplished with either of the following:

1. If the site is located in the Methane Buffer Zone, then venting is not required for paved areas that qualify for Site Design Levels I, II, or III., or
2. Install vents in accordance with Detail 13 on Sheet 8, or
3. Install landscaping areas immediately adjacent to the building exterior walls at least two feet wide covering at least 80% of the building perimeter.

E. EXISTING BUILDINGS

Additions, alterations, repairs, change of use or change of occupancy to existing buildings shall comply with the methane mitigation requirements of the Building Code, Sections 7104.1 and 7104.2, when required by Division 34, 81, or 82 of the Building Code.

Approved methane mitigation systems in existing buildings shall be maintained in accordance with Building Code, Section 7106.

F. MAINTENANCE OF MITIGATION SYSTEM

1. All gas detection and mechanical ventilation systems shall be serviced and maintained in proper working condition.
2. The procedures for maintenance and service of gas detection and mechanical ventilation systems shall be in accordance with the equipment manufacturer written instructions and meet all the requirements of the Electrical and Mechanial Code.
3. Annual and Maintenance Testing is required to be performed in accordance with the Fire Prevention Bureau (F.P.B.) Requirement No. 71 and Fire Chief's Regulation 4, Section 4J.
4. The testing of the gas detection and mechanical ventilation systems shall be performed by a person with a valid Certificate of Fitness for Gas Detection Systems as set forth in Los Angeles Municipal Code Section 57.06.01.

V. DESIGN CRITERIA

A. PASSIVE SYSTEM

1. De-Watering System

   a. De-Watering System is required when the Historical High Ground Water Table Elevation is within twelve (12) inches from the lowest Perforated Horizontal Piping.

   b. De-watering system is not required for either of the following: (1) if during the Site Testing, the groundwater level is deeper than 10 feet below the Perforated Horizontal Pipes, or (2) if the soil investigation or analysis, as approved by the Department, reveals the groundwater level is more than 12 inches below the bottom of the Perforated Horizontal Pipes.

   c. De-watering rates shall be noted on the methane mitigation plans. The engineer or geologist responsible for determining the dewatering rates shall approve the plans.

   d. Applications for water discharge location shall be approved and permitted by the Department of Public Works:

      i. Bureau of Sanitation, Industrial Waste and
      ii. Bureau of Engineering, Storm Water Management.

   e. The de-watering pipe shall be minimum Schedule 40, slotted or perforated Polyvinyl Chlorid (PVC) pipe or other materials approved under LARR for the intended use.

   f. De-watering pipes shall be installed as follows:

      i. De-watering pipes shall be sloped at ¼ inch vertical to 12 inch horizontal (2% slope). The slope may be reduced to 1% if the pipe size is increased one full size in pipe diameter.

      ii. Combination de-watering and Sub-Slab vent piping system may be used when installed with a minimum nominal 4 inch diameter pipes.

   g. Each sump pump pit shall contain a primary pump and a back-up pump.

2. Sub-Slab Vent System

   Sub-Slab Vent System shall consist of Perforated Horizontal Pipes, Gravel Blanket Under Impervious Membrane, Gravel Around Perforated Horizontal Pipes and Vent Risers.

   a. Perforated Horizontal Pipes:

      i. Perforated Horizontal Pipes shall be approved and listed, minimum Schedule 40, slotted or perforated PVC pipe or other materials approved by a LARR for the intended use.

      ii. Perforated Horizontal Pipe shall be installed as follows:

         Spacing and location of Perforated Horizontal Pipes shall be per Table 2 on Sheet 4.
         Pipes used only as vents may be installed in the horizontal position,
         Combination vent/dewatering pipes shall be sloped at ¼ inch vertical to 12 inch horizontal (2% slope) and
         Undulations in the Perforated Horizontal Pipes, which may impede the passage of gas, shall be avoided (e.g. Perforated Horizontal Pipes shall not be deformed to pass below interior footings).

   b. Gravel Blanket Thickness Under Impervious Membrane:

      i. The thickness of the Gravel Blanket under Impervious Membrane shall be per Table 1A and 1B shown on Sheet 4.

      ii. The composition of gravel shall be washed particles that have no more than one fractured face.

      iii. The gradations of gravel shall conform to Table 3 shown on Sheet 4.

      iv. The gradations of sand shall conform to Table 4 shown on Sheet 4.

   c. Gravel Thickness Around Perforated Horizontal Pipes:

      i. Gravel thickness around Perforated Horizontal Pipes shall be per Table 1A and 1B shown on Sheet 4.

      ii. When sand is used as the Gravel Blanket a geo-fabric to prevent sand from entering the Perforated Horizontal Pipes shall be placed around the Perforated Horizontal Pipes.

      iii. Gravel shall be composed entirely of particles that have no more than one fractured face.

   d. Vent Risers:

      i. Vent Risers shall be connected to Perforated Horizontal Pipes and constructed of cast iron. Exception:

         Acrylonitile Butadiene Styrene (ABS) pipes may be allowed for residential buildings up to two (2) stories, or
         Any other material approved by a LARR for the intended use as methane Vent Riser.

      ii. Vent Risers shall be spaced and located as per Table 2 on Sheet 4.

      iii. Vent Riser outlets shall be located as shown in Detail 12 on Sheet 8.

      iv. If rain guards are provided, they shall be non-restricting.

3. Impervious Membrane

   a. Impervious Membrane Installation:

      i. Impervious Membrane shall be a product approved by the LADBS Engineering Research Section with a valid Los Angeles Research Report (LARR) Number. Installation shall comply with the conditions of approval specified in a LARR and manufacturer's specification of the Impervious Membrane.

      ii. Impervious Membrane shall be installed at the following locations:

         Below the building slab surrounded by the inner face of the exterior footings

         On the exterior surface of walls from the finished grade level to a minimum of 6 inches below the bottom of the adjoining building slab
         Around sides of pile caps and caisson caps

         Exception:

         Impervious Membrane shall not be installed under exterior or interior footings.

      iii. Impervious Membranes at elevator and sump pits shall be installed as follows:

         Two layers of Impervious Membrane below slabs and footings of all elevator pits, sump pits and holding tanks. Impervious Membrane does not need to be placed below elevator pistons.

         Impervious Membrane shall be attached to the elevator piston cylinder casing or at the sump pit floor slab to prevent methane intrusion.

      iv. The individual certified by the manufacturer of the Impervious Membrane shall certify on the Impervious Membrane Installation Certificate (see Sheet 3) that the Impervious Membrane was installed per approved plans.

      v. The completed Form 3 shall be given to the inspector prior to placement of parts or the whole concrete floor slab.

   b. Seals at Impervious Membrane Penetrations:

      i. Where footings, plumbing pipes, electrical conduits and other materials penetrate the Impervious Membrane, the penetrations shall be sealed by using sleeves or boots composed of the same material or other approved materials and methods in accordance with the specifications of the manufacturer for the Impervious Membrane.

      ii. A gas tight seal shall be provided where the Impervious Membrane is attached to all interior footings and exterior wall footings.

      iii. All elevator piston shaft casing shall be constructed of a material allowed by the elevator code and sealed at the elevator pit floor slab level in accordance with the specifications of the Impervious Membrane manufacturer.

      iv. The bottom of the elevator piston casing shall be sealed to prevent gas migration into the building.

   c. Impervious Membrane Protection Prior to Floor Slab Placement

      i. Installation Sequence for Protection Material Below the Impervious Membrane:

         Finish the Gravel Blanket smooth using mechanical means (e.g. roller).
         Place geotextile filter fabric over the Gravel Blanket to protect the smooth finish of the Gravel Blanket and prevent sand migration into the Gravel Blanket.
         Prepare protective course for Impervious Membrane.

         Option A: If Sand is used as Gravel Blanket, then the Impervious Membrane may be placed directly on the geotextile, or
         Option B: If Gravel is used as for the Gravel Blanket, then place a minimum 1-inch thick Sand layer directly over the geotextile.
         Option C: If Gravel is used as the Gravel Blanket, then place a geotextile with a minimum weight of 16 ounces per square yard.

      ii. Installation Sequence for Protection Material Above the Impervious Membrane:

         Place 2-inch thick sand directly over the Impervious Membrane, or a minimum 1-inch thick lean concrete mix (slurry as specified in the Standard Specifications for Public Works Construction, Green Book)
         Place geotextile fabric if sand is used in the prior step. If lean concrete mix is used, geotextile is not required.
         Place concrete, reinforcing steel, piping and other forms so as not to be supported directly on the Impervious Membrane. Equipment shall not be driven over the Impervious Membrane or its protective covering.

B. ACTIVE SYSTEM

The Active System consists of the Sub-Slab System, Lowest Occupied Space System and Control Panel.

1. Sub-Slab System

   Sub-Slab System shall consist of a Mechanical Extraction System.

   The Mechanical Extraction System shall consist of Detectors in Vent Risers, Gas Detection and Gas extraction powered devices and shall be designed in consideration for the migration of subsurface gas from adjacent properties.

   i. Vent Risers for the Active System shall be located as follows:

      10 feet above grade,
      10 feet away from any window, doors, roof hatch, opening or air intake into the building,
      3 feet above highest point of roof within a 10' radius of outlet,
      3 feet away from any parapet,
      4 feet away from the property line and
      5 feet away from any electrical device.

   ii. Detectors in Vent Risers

      Detectors and associated transmitters shall be listed by a recognized testing laboratory for the intended use.

      Detectors and associated wiring shall be immune to radio frequency and infrared remote-transmitters frequency interference.
      Detector shall be fitted within the vent pipe so that no gas may leak through the fittings.
      The associated wiring and associated raceways shall be:
      - Mounted to a secure surface independent of detectors and their associated transmitter.
      - Protected from physical damage.

   iii. Gas Extraction Powered Devices

      Gas extraction powered devices shall consist of fans, blowers, or other powered devices to exhaust or provide make-up air into the space below the Impervious Membrane and shall be capable of ventilating the Gravel Blanket and Perforated Horizontal Pipes spaces at a rate of 3 air changes per hour.

      The total volume Gravel Blanket used to size the Gas Extraction Powered Devices shall include the volume of air (pore space) in the Gravel Blanket.

      Unless porosity of the gravel blanket material is established by a test report prepared by a licensed engineer or registered geologist, porosity of the gravel blanket material may be taken as 25%.

2. Lowest Occupied Space System

   The Lowest Occupied Space System shall consist of Gas Detection System, Mechanical Ventilation System and Alarm System.

   a. Gas Detection System

      i. The specifications for Detectors shall be the same as specified for Detectors in Vent Risers except as modified in Table 5 - Activation Thresholds for Active System.

      ii. Detectors in lowest occupied spaces shall be installed in accordance with manufacturers' requirements and listing agency approvals.
         Detectors shall be located with respect to airflow in rooms, location of probable gas leaks and the recommendations of the manufacturer.
         Number of required Detectors shall be based on Table 6 - Detector Spacing.

SITE ADDRESS:
LEGAL DESCRIPTION:
OWNER:

STANDARD PLAN:
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b. Mechanical Ventilation System

i. Mechanical Ventilation System shall consist of blowers, fans or other powered devices for exhaust or make-up air as approved by Mechanical Plan Check Section.

ii. The make-up air shall be 100% outside air.

iii. Mechanical Ventilation System shall be provided using one of the following options for garage lowest occupied and unoccupied spaces:

Option #1: Activated Mechanical Ventilation - Mechanical Ventilation System shall be capable of removing methane gas at a rate of 4 air changes per hour when activated by the Gas Detection and Control Panel, at 10% LEL (5,000 ppmv). Back-up power is not needed for mechanical ventilation in this option. Parts of fans in this Option shall be of nonferrous or non-sparking materials or their casing shall be lined or constructed of such material.

Option #2: Continuous Ventilation - Mechanical Ventilation System sized to ventilate the building spaces at a rate of one (1) air change per hour on a continuous basis. Mechanical ventilation in this option shall be provided with 24 hours of back-up power when Detectors are not provided.

Option #3: Scheduled Start-up Ventilation - Mechanical Ventilation System shall start-up at least once every (6) six hours to provide a minimum of 24 air changes per day. Mechanical ventilation in this option shall be provided with 24 hours of back-up power when Detectors and are not provided.

Option #4: Alternate Natural Ventilation - Alternate method of ventilation may be utilized in lieu of mechanical ventilation in Options #1, #2 and #3 when designed in accordance with the Natural Ventilation requirements of this Standard Plan.

c. Alarm Systems

i. Alarm Systems shall consist of audible and visual signals to notify occupants of significant levels of methane intrusion into the building and shall be designed with the Sequence of Operation shown in Table 5 of this Standard Plan.

ii. Audible alarms shall be at least 15dB above ambient noise level in all areas subject to methane gas intrusion.

iii. Visual alarms shall be a minimum of 15-candela output and be located at each audible device.

iv. The audible signal warning building occupants of significant levels of methane gas shall be distinctively different from the fire alarm system.

v. Signs shall be posted adjacent to each alarm signaling device indicating, "Methane Alarm-Evacuate Building."

3. Control Panel

a. General Installation

i. Control Panel shall be listed by a recognized testing laboratory.

ii. Control Panel shall have the following characteristics:

Designed not to override the building fire alarm, smoke control and ventilation systems.

A manual shall be provided with the Control Panel describing the installation, wiring, operation, maintenance and testing.

b. Power Source

i. Primary Power Source

Control Panel shall be hard wired to the building normal power. The circuits supplying power to the Control Panel shall be lockable in the open position.

ii. Back-Up Power Supply

Control Panel shall monitor the power to Detectors, annunciator and associated components.

Back-Up battery or emergency power shall be rated for a minimum of 24 hours for standby mode plus 5 minutes of alarm under full load condition.

This Back-Up power shall be available within 60 seconds of primary power loss.

c. Panel Operation

i. Device Activation

Control Panel shall recognize alarm conditions, and then activate required audible devices, visual devices and Gas Extraction Powered Devices.

Components of the Active System shall be activated as shown in the Table 5 on Sheet 4 - Activation Thresholds For Active Systems.

ii. Trouble Annunciation

Control Panel or annunciator shall indicate each trouble or alarm condition by a visual alarm.

Control Panel shall supervise and identify fault and trouble conditions with the following:

- Main supply circuits,
- Rechargeable battery circuits,
- Initiating device circuits,
- Alarm device circuits,
- Supplementary or auxiliary signaling circuits and,
- Signaling line circuits.

C. MISCELLANEOUS SYSTEMS

1. Trench Dam

Trench dams are intended to prevent travel of underground gas into buildings or structures along the trench backfill.

a. A Trench Dam shall be installed in all electrical, plumbing, gas, or other trenches beneath the building foundation.

b. If piping and conduits are placed before certified compacted soil as part of the site preparation for the building pad, then trench dams will not be required.

c. Trench dams shall be installed in the trench immediately adjacent to the exterior perimeter of the building foundation.

d. A Trench Dam shall have a minimum length of twice the width of the trench or a minimum of 36 inches in length.

e. Trench dams may be of the following:

i. Bentonite Cement Slurry - A mixture of 4% Type II Cement, and 2% Powdered Bentonite, or

ii. Compacted Native Soil Backfill - Native soil shall be compacted to at least 90% relative compaction in accordance with ASTM D-1557 Testing Procedures.

f. The entire cross section of trenches shall be backfilled to provide a minimum of 6 inches of trench dam material around all conduits and pipes.

2. Hazardous Area Classification

For the purpose of determining the appropriate electrical wiring method and equipment, boundaries of the hazardous area classification are specified in Tables 7, 8 and 9. The Hazardous Area Classification, except as noted below, is based on the measured gas concentration and pressure as indicated in Site Investigation report:

a. In the absence of pressure reading in a site investigation report, the area classification shall be based on soil gas pressure that is greater than 2 inches of water.

b. In the absence of a site investigation report, the area classification shall be based on Methane Design Level V.

3. Wiring

The wiring system shall be in accordance with the Los Angeles Electrical Code and as required herein.

a. Depressurization Enclosure

i. Wiring system between a classified area and a non-classified area shall be supplemented by a Depressurization Enclosure when the Design Methane Pressure is greater than 6 in. of water.

Depressurization enclosure is not required when each continuous underground wiring duct bank system supplied from an approved vented manhole is less than 500 linear ft. (152.4 m.) from a termination point and the total load does not exceed 80% of the rating of the conductors. Longer duct bank run may be permitted when justified by engineering analysis.

Depressurization enclosure is not required when the maximum-recorded pressure does not exceed the rating of a listed and approved seal fitting.

ii. The wiring system supplied from the Depressurization Enclosure shall be installed above ground.

iii. The Depressurization Enclosure shall be suitable for the location and shall contain only electrical wiring. The depressurizing enclosure shall be located outdoors and shall comply with one of the following options:

A standard pull box fitted with a breather suitable for Class I, Group D locations where:

- The breather shall be located on the side of the enclosure within 2 inches from the top of the pull box.
- The breather shall have minimum dimensions of 1.5 inches long and 15/16 inch diameter; or

A standard pull box fitted with louvered ventilation where:

- The louvered openings shall be within 2 inches from the top of the box.
- The minimum total enclosure ventilation opening shall be 1.41 square inches. A louvered pull box shall be installed in a non-classified area.

b. Outdoor Enclosures

All outdoor enclosures with open bottoms, when installed on grade or finished floors, shall be mounted on a minimum 2-in. (5.08 cm.) thick concrete pad over a 30 mil (0.076 cm.) High Density Polyethylene (HDPE) or equivalent approved impervious membrane. All membrane penetrations shall be suitably sealed against transmission of gas into the enclosure.

c. Conduit Seal Fittings and Cable Seal Fittings

Conduit Seal Fittings and Cable Seal Fittings are designed to prevent the passage of gases, vapors, or flames inside the electrical conduits.

i. Conduit or Cable Seal Fittings are required where conduits or cables pass through a classified hazardous area per the Los Angeles Electrical Code and as required in this Standard Plan.

ii. Any conduit or cable that penetrates the Impervious Membrane shall be provided with a conduit or cable seal.

iii. Conduit Seal Fittings shall be installed in the vertical portion of conduit where the PVC conduit emerges from a classified location. Rigid material shall be rigid metal that has the same trade size as conduit runs.

d. Grounding Electrical Systems

Electrical systems required by the Los Angeles Electrical Code to be grounded shall be connected to earth using the prescriptive or performance (Soil Resistance) method.

i. Prescriptive Method

When a Ground Ring is not used as part of the Grounding Electrical Systems required by the Los Angeles Electrical Code at least one of the following supplemental grounding electrodes shall be used:

Rod and Pipe Electrodes
Plate Electrodes

The supplemental grounding electrode conductor shall not be reduced in size.

ii. Soil Resistance Method

Grounding systems other than specified in the Prescriptive Method shall be based on Soil Electrical Resistivity Test as follows:

Soil Electrical Resistance

- The soil resistivity shall be measured by the four-point method as described in IEEE Standard 81-1983.
- The measurement of soil resistance shall take into account the geological features of the soil as determined by the engineer.
- Whenever driven ground rods are to be used, the soil resistivity measurement shall correlate with the installed effective depth of the ground electrodes.
- The engineering analysis of the data shall take into account the expected soil temperature, moisture and gas or soluble chemical contents.tion
- The engineering analysis shall reflect the uniformity of soil resistivity using not less than ten readings based on the test pin electrode spacing.
- The soil resistivity measurement shall be based on embedment of the electrodes below the permanent moisture level, when such installation is possible.

Measurement

- For installations of multiple rod and pipe or plate electrodes in a single row, measurement shall be in a straight line at the location were these electrode(s) are intended to be installed.
- For installations of ground ring (circular or square), grids, grid beds, radial, etc, the area that is to be used for grounding shall be divided into rows. Each row shall be equally spaced apart. The measurement shall be started at the corner of the first row and then continued through each pre-determined point in the row. This measurement is then repeated through the last row. The measurement shall be performed until all pre-determined points are covered.
- These measurements shall account for water table, soil layers, corrosion, etc. when applicable.

Soil Electrical Resistance Design:

- For multiple rod and pipe or plate electrodes installed in a straight line, the measured current and voltage shall be used to calculate the average soil resistivity.
- For an area, the measured current and voltage shall be used to calculate the average soil resistivity for each row. The highest calculated average soil resistivity of any row shall be used to calculate the soil resistivity.
- In the event the soil in the area or location under consideration is found to be non-uniform, the soil shall be modified and the test(s) shall be repeated. Ground Resistance (Impedance) Limitation - The overall ground resistance (Impedance) of a grounding electrode system shall not exceed 25 ohms for 600 volts or less low voltage systems and not to exceed 5 ohms for over 600 volts high voltage systems.

4. Manholes and Other Underground Electric Enclosures Intended for Personnel Entry

The provisions of this section are applicable to all manholes and other underground electric enclosures that are intended for personnel entry. These enclosures herewith will be referred to as underground electrical enclosures.

a. Vent System

i. Underground electrical enclosures shall be naturally ventilated at all time to open air in an approved manner to prevent the build-up of methane.

ii. Mechanical ventilation in lieu may be used when back-up power sufficient to run the system for 24 hours is provided and a visual and audible main power failure alarm at a readily accessible location.

b. Enclosure Exterior

i. Approved seals shall be used to prevent water and methane gas from entering the sides of the underground electrical enclosures.

ii. Underground electrical enclosures personnel entry access cover shall be provided with an approved restraining system.

iii. Soil gases under the underground electrical enclosures shall be vented in a manner shown in the Standard Plan Details.

c. Enclosure Interior

i. All wiring terminations, equipment and insulating materials within the enclosure shall be suitable for wet location.

ii. Approved duct seals shall be used to prevent water from the conduits entering or leaving the manholes and other underground electrical enclosures intended for personnel entry. The seal shall have a depth of not less than the diameter of the conduit.

5. Additional Vent Risers

The total quantity of installed Vent Risers shall be increased to double the rate for the Passive System.

VI. SYSTEMS MAINTENANCE

A. PROCEDURES

The maintenance and service procedures for each gas detection and mechanical ventilation systems shall be in accordance with the manufacturers written instructions and the Fire Prevention Bureau (F.P.B.) Requirment No. 71 Fire Cheif's Regulation 4, Section 4J.

B. SCHEDULE

1. The maintenance schedule shall be as recommended by the manufacturer of each gas detection and mechanical ventilation system component.
2. Notwithstanding the recommendations of the manufacturer, testing, maintaining, and servicing of each system shall be in accordance with the schedule required by the Fire Department.

C. REPAIRS

All components required to mitigate methane hazards shall be repaired or replaced to the manufacturer's original specification.

D. OCCUPANT NOTIFICATION

A permanent notification shall be provided at each building indicating the presence of the methane Impervious Membrane. This notification shall be at the front entrance, be visible and be legible as approved by the Engineer and LADBS. See Detail 14 on Sheet 8.

VII. EMERGENCY PLAN

An emergency plan outlining emergency procedures shall be established for all buildings with a gas-detection system, with the exception of buildings with R3 or U Occupancies. The procedures shall include, but not limited to, the identification of the responsible person assigned to manage the contingency plan, posting of the contingency plan and the approval process of the contingency plan.

A. RESPONSIBLE PERSON

The assigned responsible person shall work with the Fire Department in the establishment, implementation and maintenance of an emergency plan.

B. POSTING

A sign shall be posted in a conspicuous location designated by the Fire Department with the Fire Department's telephone number.

C. APPROVAL

All contingency plans for emergency procedures shall be approved by the Fire Department.

SITE ADDRESS:

LEGAL DESCRIPTION:

OWNER:

STANDARD PLAN:
METHANE HAZARD MITIGATION
Not to be used for Playa Vista Phase I Projects

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FORM 1 - CERTIFICATE OF COMPLIANCE FOR METHANE TEST DATA

Part 1: Certification Sheet
Site Address:_____
Legal Description: Tract:_____Block:_____Lot:_____
Building Use:_____

Name: Mailing Address: Telephone: Name of Testing Laboratory: Telephone:	Architect's, Engineer's, or Geologist's Stamp

I hereby certify that I have tested the above site for the purpose of methane mitigation and that all procedures were conducted in conformity with the requriements of the LADBS Methane Mitigation Standard. Where the inspection and testing of all or part of the work above is delegated, full responsability shall be assumed by the license individual whose signature is affixed thereon.

Signed:_____Date:_____

Required Data:
- Project is located in the Methane Zone / Methane Buffer Zone.
- Depth of ground water table:_____feet below the Impervious Membrane.
- Design Methane Concentration:_____parts per million by volume (ppmv)
- Design Methane Pressure:_____inches of water column.
- Site Design Level (Level I, II, III, IV, or V) with _____ inches of water column.

De-watering:
- De-watering (is) (is not) required.
- Pump Discharge Rate:_____cubic feet per minute.
- Reference Geology or Soils Report:_____dated:_____

Additional Investigation:
- Additional Investigation (was) (was not) conducted.

Latest Grading on Site:
- Date of last grading on site was:_____
- See Attached explanation of the effect on soils gas survey results by grading operations:

Part 2: Test Data
Site Address:_____
Description of Gas Analysis Instrument(s):_____
Instrument Name and Model:_____

Date	Time	Probe Set #	Concentration (ppmv)	Pressure (inches water column)	Sensor depth (feet)	Description / Sensor Location

FORM 2 - CERTIFICATE OF COMPLIANCE FOR SOILS ELECTRICAL RESISTIVITY TEST

Part 1: Certification Sheet
Site Address_____
Legal Description: Tract:_____Lot:_____Block:_____
Building Use:_____

Name: Mailing Address: Telephone: Name of Testing Laboratory: Telephone:	Architect's, Engineer's, or Geologist's Stamp:

I hereby certify that I have tested the above site for the purpose of methane mitigation and that all procedures were conducted in conformity with the requirements of the LADBS Information Bulletin P/BC 2002-101. Where the inspections and testing of all or part of the work above is delegated, full responsability shall be assumed by the licensed individual whose signature is affixed thereon.

Signed:_____Date:_____

Summary of Findings:
- Measured Soils Electrical Resistivity:
  Highest:_____Ohms; Lowest:_____Ohms; Average:_____Ohms.
- Measured temperature:_____; Humidity:_____
-Last rainfall was:_____days ago.

Part 2: Test Data

Date	Time	Probe #	Resistance (Ohms)	Soil pH	Prove depth (feet)	Description/Probe Location

Sketch locations of the electrical probes:

FORM 3 - IMPERVIOUS MEMBRANE INSTALLATION CERTIFICATE
***After installation of the Impervious Membrane, copy of this certificate shall be given to the Building Inspector.**

Site Address:_____
Legal Description: Tract:_____Block:_____Lot:_____
Building
Use:_____

Name: Mailing Address: Telephone:

I hereby certify that I have inspected the installation and reviewed the test results of the Impervious Membrane system at the above described property. On the basis of these inspections and tests it is my conclusion that the Impervious Membrane system was installed in conformity with the recommendations of the manufacturer and the requirements of this Standard Plan. Where the inspection and testing of all or part of the work above is delegated, full responsability shall be assumed by the Certified Installer whose signature is affixed thereon.

Signed:_____Date:_____

SITE ADDRESS:
LEGAL DESCRIPTION:
OWNER:

STANDARD PLAN:
METHANE HAZARD MITIGATION
Not to be used for Playa Vista Phase I Projects

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Table 1A - MITIGATION REQUIREMENTS FOR METHANE ZONE (See notes)

Site Design Level			Level I		Level II		Level III		Level IV		Level V
Design Methane Concentration (ppmv)			0 - 100		101 - 1,000		1,001 - 5,000		5,001 - 12,500		> 12,500
Design Methane Pressure (See note 1) (inches of water column)			2"	> 2"	2"	> 2"	2"	> 2"	2"	> 2"	All Pressure
PASSIVE SYSTEM		De-watering System	X	X	X	X	X	X	X	X	X
	Sub-Slab Vent System	Perforated Horizontal Pipes	X	X	X	X	X	X	X	X	X
		Gravel Blanket Thickness Under Impervious Membrane	2"	2"	2"	3"	2"	3"	2"	4"	4"
		Gravel Thickness Surrounding Perforated Horizontal Pipes	2"	2"	2"	3"	2"	3"	2"	4"	4"
		Vent Risers	X	X	X	X	X	X	X	X	X
	Impervious Membrane		X	X	X	X	X	X	X	X	X
ACTIVE SYSTEM	Sub-Slab System	Mechanical Extraction System (See note 2)								X	X
	Lowest Occupied Space System	Gas Detection System (See note 3)		X		X	X	X	X	X	X
		Mechanical Ventilation (See notes 3, 4, 5)		X		X	X	X	X	X	X
		Alarm System		X		X	X	X	X	X	X
	Control Panel			X		X	X	X	X	X	X
MISC. SYSTEM	Trench Dam		X	X	X	X	X	X	X	X	X
	Conduit or Cable Seal Fitting		X	X	X	X	X	X	X	X	X
	Additional Vent Risers (See note 5)										X

Table 1B - MITIGATION REQUIREMENTS FOR METHANE BUFFER ZONE (See notes)

Site Design Level			Level I		Level II		Level III		Level IV		Level V
Design Methane Concentration (ppmv)			0 - 100		101 - 1,000		1,001 - 5,000		5,001 - 12,500		> 12,500
Design Methane Pressure (See note 1) (inches of water column)			2"	> 2"	2"	> 2"	2"	> 2"	2"	> 2"	All Pressure
PASSIVE SYSTEM		De-watering System		X		X		X	X	X	X
	Sub-Slab Vent System	Perforated Horizontal Pipes		X		X		X	X	X	X
		Gravel Blanket Thickness Under Impervious Membrane		2"		3"		3"	2"	4"	4"
		Gravel Thickness Surrounding Perforated Horizontal Pipes		2"		3"		3"	2"	4"	4"
		Vent Risers		X		X		X	X	X	X
	Impervious Membrane			X		X		X	X	X	X
ACTIVE SYSTEM	Sub-Slab System	Mechanical Extraction System (See note 2)								X	X
	Lowest Occupied Space System	Gas Detection System (See note 3)		X		X		X	X	X	X
		Mechanical Ventilation (See Notes 3, 4, 5)		X		X		X	X	X	X
		Alarm System		X		X		X	X	X	X
	Control Panel			X		X		X	X	X	X
MISC. SYSTEM	Trench Dam			X		X		X	X	X	X
	Conduit or Cable Seal Fitting			X		X		X	X	X	X
	Additional Vent Risers (See note 5)										X

NOTES FOR TABLES 1A AND 1B:

"x" = Indicates a required mitigation component

1. De-watering is not required when the maximum Historical High Ground Water Table Elevation, or projecterd post-construction ground water level, is more than 12 inches below the bottom of the Perforated Horizontal Pipes.
2. The Mechanical Extraction System shall be capable of providing an equivalent of a complete change of air 20 minutes of the total volume of the Gravel Blanket.
3. The mechanical ventilation system shall be capable of providing an equivalent of one complete change of the lowest occupied space every 15 minutes.
4. Vent openings to comply with Item IV.B.4 on sheet 1 may be used in lieu of mechanical ventilation.
5. The total quantity of the installed Vent Risers shall be increased to twice the rate for the Passive System.

Table 2 - SPACING OF PERFORATED HORIZONTAL PIPES AND NUMBER OF VENT RISERS

MIN. VENT RISERPIPE DIAMETER (inches)	MAX. SUB-SLAB PERFORATED HORIZONTAL PIPE SPACING (feet)	MAX. SUB-SLAB COMBINATION PERFORATED HORIZONTAL PIPE FOR DEWATERING AND VENT SPACING (feet)	NUMBER OF VENT RISER PER BUILDING FOOTPRINT AREA (square feet)
1 1/2	12.5	Not allowed	1/1,250 (min of 2 risers)
2	25	Not allowed	1/2,500 (min of 2 risers)
2 1/2	50	Not allowed	1/5,000 (min of 3 risers)
3	75	Not allowed	1/7,500 (min of 4 risers)
4	100	50	1/10,000 (min of 4 risers)

NOTE:

1. Riser length shall be a maximum of 100' measured along solid pipe (including bends).
2. Vent Risers max spacing shall be 100' measured between vent risers.
3. When the application of the spacing and location requirement of this table results in the requirement of a fractional number of Vent Risers, any fraction shall be construed as one Vent Riser.
4. Horizontal pipes shall always be equal or larger in diameter than the vertical risers.
5. Building Footprint shall be defined as the area in square feet contained within the exterior walls at or below the grade level.
6. Vent Risers shall be located as per the above table for buildings with footprint areas covering up to 100,000 square feet.
7. Vent Risers in buildings with footprint area covering over 100,000 square feet may use the minimum standards in the above table or an alternate method justified by engineering calculations approved by the LADBS.
8. Number of required vent risers shall be determined by the selected riser pipe diameter and the rate of vent riser per building footprint area.

Table 3 - SPECIFICATIONS FOR GRAVEL

SIEVE SIZE	PERCENTAGE PASSING SIEVE	
	3/4" Gravel	3/8" Gravel
1-1/2" (37.5 mm)	100	-
1" (25.0 mm)	90-100	-
3/4" (19.0 mm)	55-85	100
3/8" (9.5 mm)	8-20	85-100
No. 4 (4.75 mm)	0-5	0-30
No. 8 (2.36 mm)	0-5	0-10
No. 200 (75um)	0-2	0-2
ASTM C 131 TEST GRADING	B	C

Table 4 - SPECIFICATIONS FOR SAND

SIEVE SIZE	PERCENTAGE PASSING SIEVE
3/8" (9.5 mm)	100
No. 4 (4.75 mm)	90-100
No. 8 (2.36 mm)	75-90
No. 16 (1.18 mm)	55-75
No. 30 (600 um)	30-50
No. 50 (300 um)	10-25
No. 100 (150 um)	2-10
No. 200 (75 um)	0-5

Table 5 - ACTIVATION THRESHOLDS FOR ACTIVE SYSTEM

		SYSTEM COMPONENT TRIGGERED BY DETECTORS AND GAS SENSORS		
		Detector in the Lowest Occupied Space		Gas Sensor in Vent Risers
System Name	System Component	More Than 10% LEL	More Than 25% LEL	More Than 75% LEL
Below Impervious Membrane System	Warning Annunciator			
	Mechanical Extraction Fan			X
Lowest Occupied Space System	Mechanical Ventilation	X	X	
	Alarm (audible and visible)		X	
	Warning Annunciator	X	X	X

NOTE:

* Gas Detection Control Panels as part of the Lowest Occupied Space Systems and Below Impervious Membrane Systems, shall determine the gas concentration using a time weighted average of 10 minutes.

Table 6 - DETECTOR SPACING

ROOM FLOOR AREA OR CONCEALED SPACE AREA (square feet)	NUMBER OF DETECTORS *	
	WITH HEATING, VENTILATION AND AIR CONDITIONING	WITHOUT HEATING, VENTILATION AND AIR CONDITIONING
10,000 and More	Minimum of 3 Detectors plus one for every 20,000 and fraction thereof in excess of 10,000	Minimum of 6 Detectors plus one for every 2,500 and fraction thereof
More Than 5,000 and Less Than 10,000	3 Detectors	Minimum of 2 Detectors plus one for every 2,500 and fraction thereof
More Than 1,000 and Up to 5,000	2 Detectors	Minimum of 1 Detector plus one for every 2,500 and fraction thereof
0 and Up to 1,000	1 Detector	1 Detector

NOTE:

* In addition to the required number of Detectors in this table, there shall be at least one Detector in each elevator shaft and enclosed stairway.

SITE ADDRESS:
LEGAL DESCRIPTION:
OWNER:

STANDARD PLAN:
METHANE HAZARD MITIGATION
Not to be used for Playa Vista Phase I Projects

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Table 7 - OUTDOOR HAZARDOUS AREA CLASSIFICATION *

LOCATION	PAVEMENT SIZE	METHANE DESIGN LEVEL	MEASURED SOIL GAS CONCENTRATION (ppmv)	MEASURED SOIL GAS PRESSURE (inches of water)	HAZARDOUS AREA CLASSIFICATION
Below finished grade	None	I, II, III or IV	Less than 12,500	Less than 2	Unclassified
		I, II, III or IV	Less than 12,500	Greater than 2	5' or less depth; Unclassified 5' to 10' depth; Class I, Division 2 Over 10' depth; Class I, Division 1
		V	Greater than 12,500	N/A	
Below finished grade with pavement greater than 15' from the outside wall of a building or structure *	Less than 5,000 sq. ft. or Greater than 5,000 sq. ft. & Less than 25' in width	I, II, III or IV	Less than 12,500	Less than 2	Unclassified
		I, II, III or IV	Less than 12,500	Greater than 2	5' or less depth; Unclassified 5' to 10' depth; Class I, Division 2 Over 10' depth; Class I, Division 1
		V	Greater than 12,500	N/A	
Below finished grade with pavement greater than 15' from the outside wall of a building or structure *	Greater than 5,000 sq. ft.	I, II or III	Less than 5,000	Less than 2	Unclassified
		IV	Less than 12,500 but more than 5,000	Less than 2	2.5' or less depth; Unclassified 2.5' to 10' depth; Class I, Division 2 Over 10' depth; Class I, Division 1
		I, II, III or IV	Less than 12,500	Greater than 2	10' or less depth; Class I, Division 2 Over 10' depth; Class I, Division 1
		V	Greater than 12,500	N/A	
Below finished grade with pavement less than or equal to 15' from the outside wall of a building or structure	Greater than 5,000 sq. ft.	I, II or III	Less than 5,000	Less than 2	2.5' or less depth; Unclassified 2.5' to 10' depth; Class I, Division 2 Over 10' depth; Class I, Division 1
		IV	Less than 12,500 but more than 5,000	Less than 2	10' or less depth; Class I, Division 2 Over 10' depth; Class I, Division 1
		I, II, III or IV	Less than 12,500	Greater than 2	Glass I, Division 1
		V	Greater than 12,500	N/A	
	Less than 5,000 sq. ft.	I, II, III or IV	Less than 12,500	Less than 2	Unclassified
		I, II, III or IV	Less than 12,500	Greater than 2	5' or less depth; Unclassified 5' to 10' depth; Class I, Division 2 Over 10' depth; Class I, Division 1
		V	Greater than 12,500	N/A	
Sump Pump Pit: Totally Submergeed	N/A	N/A	N/A	N/A	Unclassified
Sump Pump Pit: Partially Submerged					Class I, Division 2
Sump Pump Pit: Dry					Class I, Division 1
Above Grade	Regardless	N/A	N/A	N/A	Unclassified

NOTE:
* Unpaved open areas, such as planters or landscaping not less than 3' x 3' spaced at less than or equal to 50' from each others edge, the area in between them shall be treated as an area that is less than 5,000 sq. ft.. If the space in between them exceeds 50', that area can be construed as less than 5,000 sq. ft. provided that the conduit or cable is installed in a trench and back filled with 3/4-inch aggregate or gravel up to the grade.

Table 8 - VENT RISER HAZARDOUS AREA CLASSIFICATION

LOCATION	POWER VENTILATED	HEMISPHERICAL DISTANCE FROM THE RIM OF THE VENT, A JOINT OR A FITTING	HAZARDOUS AREA CLASSIFICATION
Vent Outlet	No	Within 0 to 3 feet	Class I, Division 1
		Within 3 feet to 5 feet	Class I, Division 2
		Over 5 feet	Unclassified
	Yes	Within 0 to 5 feet	Class I, Division 1
		Within 5 feet to 10 feet	Class I, Division 2
		Over 10 feet	Unclassified
Joints and fittings not enclosed within wall spaces*	N/A	Within 0 to 3 feet	Class I, Division 2
		Over 3 feet	Unclassified
Joints and fittings in framed walls*	N/A	Any distance within the frame stud bay	Class I, Division 1
In the Vent System	N/A	N/A	Class I, Division 1
Gas Sampling Port	N/A	Within 0 to 3 feet	Class I, Division 2
Mechanical extraction vent with direct drive blade motor with a mechanical check valve in the outlet of the motor duct.	Yes	N/A	Unclassified
Mechanical extraction vent with direct drive blade motor without a check valve in the outlet of the motor duct.	Yes	Within 0 to 3 feet	Class I, Division 2

NOTE:
* The hazardous area designation for these areas is considered as unclassified under any one of the following conditions:
  a. All joints and fittings are welded in approved manner,
  b. Approved double walled vent risers are provided, or
  c. Approved four inch or smaller threaded steel pipe venting system or equivalent approved piping system is installed.

Table 9 - BUILDING HAZARDOUS AREA CLASSIFICATION

LOCATION	METHANE DESIGN LEVEL	MEASURED SOIL GAS CONCENTRATION (ppmv)	MEASURED SOIL GAS PRESSURE (inches of water)	HAZARDOUS AREA CLASSIFICATION
Below Impervious Membrane	I or II	Less than 1,000	Less than 2	Unclassified
	III or IV	Less than 12,500 but more than 1,000	Less than 2	10' or less depth; Class I, Division 2 Over 10' depth; Class I, Division 1
	I, II, III or IV	Less than 12,500	Greater than 2	Class I, Division 1
	V	Greater than 12,500	N/A	
Below grade within the raised floor foundation or lowest building slab without an Impervious Membrane	I, II, III or IV	Less than 12,500	Less than 2	10' or less depth; Class I, Division 2 Over 10' depth; Class I, Division 1
	I, II, III or IV	Less than 12,500	Greater than 2	Class I, Division 1
	V	Greater than 12,500	N/A	
Above grade within the raised floor foundation footing without an Impervious Membrane but with adequate ventilation per Standard Plan	I, II, III or IV	Less than 12,500	Less than 2	Unclassified
	I, II, III or IV	Less than 12,500	Greater than 2	Class I, Division 2
	V	Greater than 12,500	N/A	
Above Impervious Membrane, but below the lowest building slab or raised floor foundation	I, II, III or IV	Below Impervious Membrane Less than 12,500	Below Impervious Membrane Greater than 2	Unclassified
	I, II, III or IV	Below Impervious Membrane Less than 12,500	Below Impervious Membrane Less than 2	
	V	Below Impervious Membrane Greater than 12,500	N/A	Class I, Division 2
Above Impervious Membrane, through the lowest building slab or Above slab	N/A	N/A	N/A	Unclassified
Sump Pump Pit: Totally Submergeed	N/A	N/A	N/A	Unclassified
Sump Pump Pit: Partially Submerged				Class I, Division 2
Sump Pump Pit: Dry				Class I, Division 1

SITE ADDRESS:
LEGAL DESCRIPTION:
OWNER:

STANDARD PLAN:
METHANE HAZARD MITIGATION
Not to be used for Playa Vista Phase I Projects

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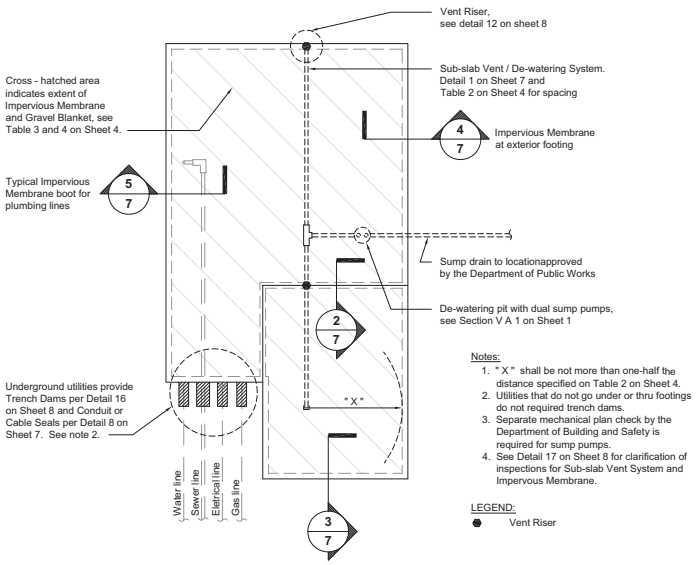
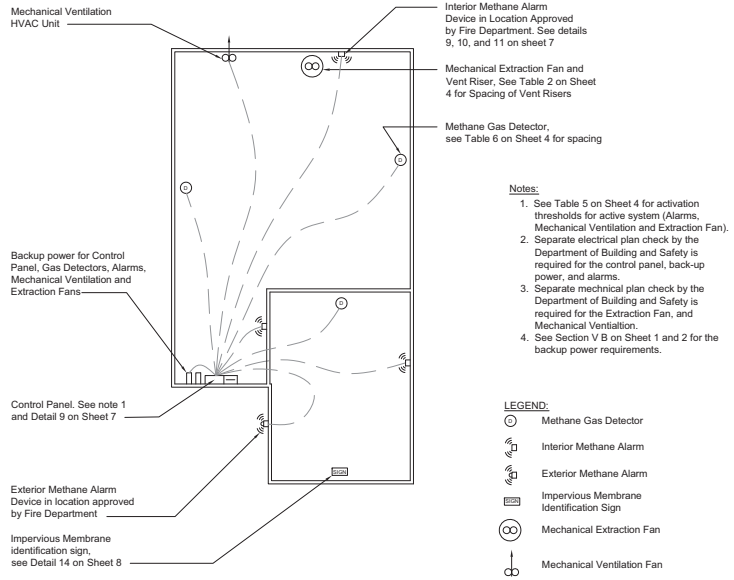


Sample Plan For Below Slab Methane Mitigation Components



Sample Plan For Above Slab Methane Mitigation Components

Below Slab Methane Mitigation Components

Above Slab Methane Mitigation Components

SITE ADDRESS:

LEGAL DESCRIPTION:

OWNER:

STANDARD PLAN:
METHANE HAZARD MITIGATION
Not to be used for Playa Vista Phase I Projects

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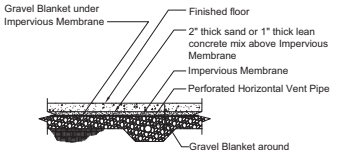
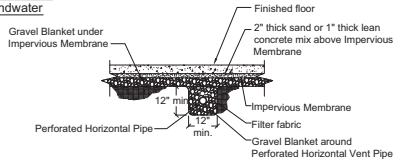
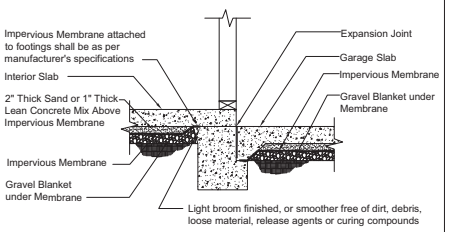
Alternative A:
No Groundwater



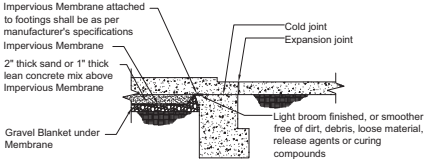
Alternative B:
Groundwater



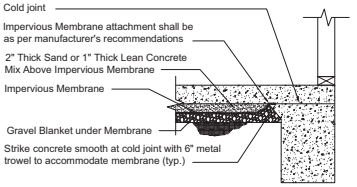
Sub-Slab Vent System — ***Detail 1*** Scale: Not to Scale



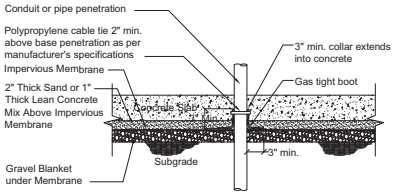
Membrane Termination at Garage/Dwelling Floor Transition — ***Detail 2*** Scale: Not to Scale



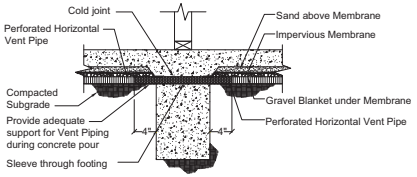
Membrane Termination at Garage Grade Beam — ***Detail 3*** Scale: Not to Scale



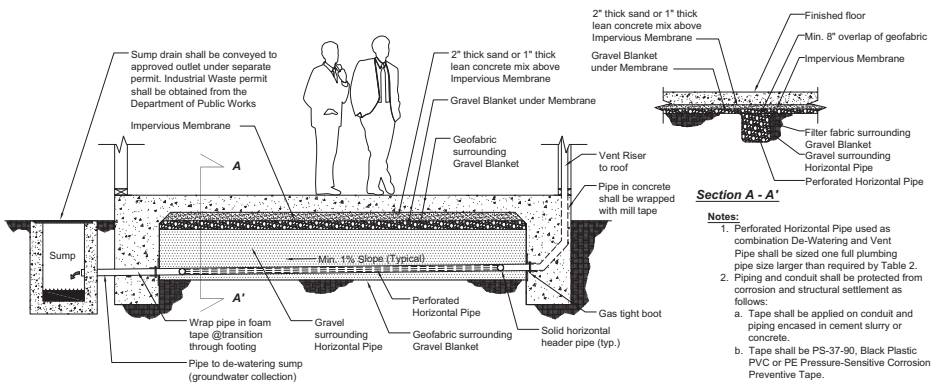
Membrane Termination at Exterior Footing - Two Pour — ***Detail 4*** Scale: Not to Scale



Membrane Boot — ***Detail 5*** Scale: Not to Scale



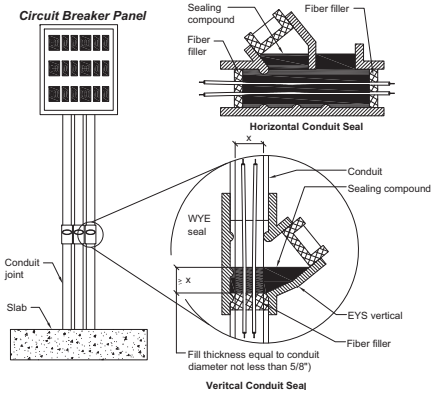
Vent Pipe at Interior Footing — ***Detail 6*** Scale: Not to Scale



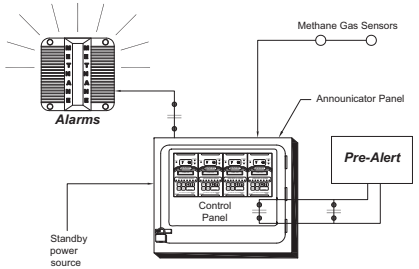
Section A - A'

Notes:
1. Perforated Horizontal Pipe used as combination De-Watering and Vent Pipe shall be sized one full plumbing pipe size larger than required by Table 2.
2. Piping and conduit shall be protected from corrosion and structural settlement as follows:
   a. Tape shall be applied on conduit and piping encased in cement slurry or concrete.
   b. Tape shall be PS-37-90, Black Plastic PVC or PE Pressure-Sensitive Corrosion Preventive Tape.

Combination De-Watering and Vent Pipe — ***Detail 7*** Scale: Not to Scale

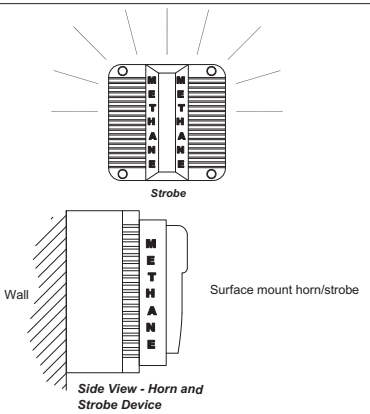


Conduit Seal — ***Detail 8*** Scale: Not to Scale



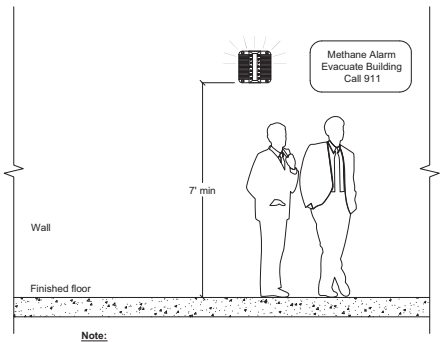
Notes:
1. The Methane Gas Detection System shall operate 24 hr./day continuously.
2. All building strobe/alarms to sound simulaneously upon any high Gas Detection in building.
3. Auto dialer shall not be required for single family dwellings.
4. Standby power shall provide sufficient power to the Methane Gas Sensors for 24 hours.

Methane Detection System — ***Detail 9*** Scale: Not to Scale



Side View - Horn and Strobe Device

Methane Alarm Device - Horn and Strobe Combination — ***Detail 10*** Scale: Not to Scale



Note:
All methane Audio/Visual Alarms shall be installed above the floor at a standard height of 7 feet with adjacent signage (as shown) unless otherwise noted.

Methane Alarm Device Mount — ***Detail 11*** Scale: Not to Scale

SITE ADDRESS:
LEGAL DESCRIPTION:
OWNER:

STANDARD PLAN:
METHANE HAZARD MITIGATION
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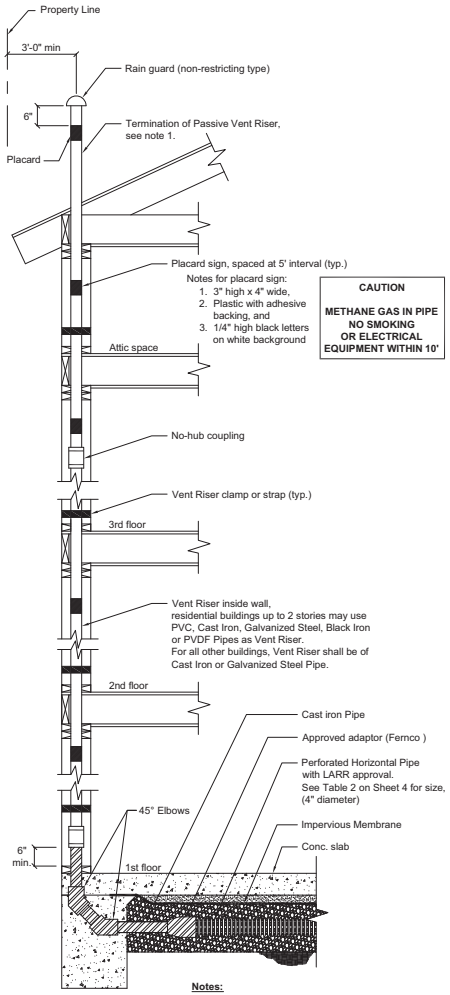
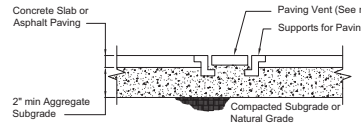


Notes:

1. Termination of Passive Vent Riser shall be as follows (LAMC 94.906.0):
   a. 10' min. away from, or at least 3' above any openable window, door, opening or air intake, or vent shaft.
   b. 3' min. in every direction from any lot line, alley, and street.
   c. Extend through the vent flashing, 6" min. above the roof, and 1' min. from any parapet or building wall.
2. Wrap all piping with approved material through concrete slab or floor.
3. Support all piping per Table 3-2 of Los Angeles Plumbing Code.
4. The piping of the venting system shall be tested with air in accordance with Section 94.712.3 of the Los Angeles Plumbing Code.

Vent Riser — **Detail 12** Scale: Not to Scale



Notes:

1. Paving Vent shall be constructed on cast iron.
2. Paving Vent shall be installed at the same rate as the vent risers shown in Table 2 for corresponding openings.
3. Paving Vent shall be spaced a maximum of 100' apart.
4. Net area of openings in each Paving Vent shall be 12 square inches.

Paved Areas Venting — **Detail 13** Scale: Not to Scale

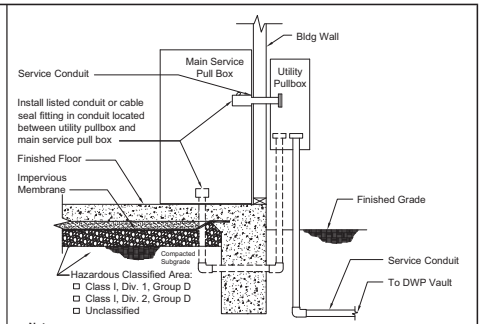
WARNING

THIS BUILDING IS PROTECTED WITH A METHANE GAS CONTROL BARRIER. ANY PROPOSED PENETRATION OR ALTERATION OF FLOOR SLAB REQUIRES NOTIFICATION OF THE BUILDING OFFICIAL AND INSPECTION BY AN ENGINEER

Notes:

1. This notification is to be permanently stamped or etched in the surface of the garage slab or other location approved by the Building Inspector at the time of construction.
2. All letters 1/2" (min.) in height.
3. At least one required per building.
4. This notification shall be posted and maintained at the front entrance of the building, except residential buildings.

Gas Membrane notification placard — **Detail 14** Scale: Not to Scale

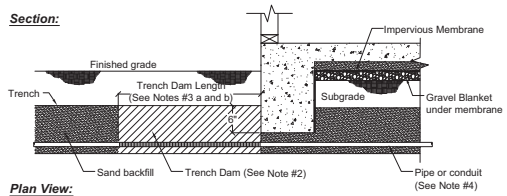


Note:

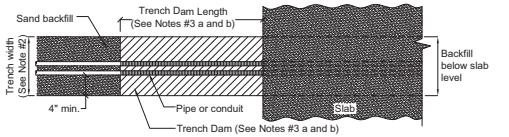
1. Piping and conduit shall be protected from corrosion and structural settlement as follows:
   a. Tape shall be applied on conduit and piping encased in cement slurry or concrete.
   b. Tape shall be PS-37-90, Black Plastic PVC or PE Pressure - Sensitive Corrosion Preventive Tape.

Conduit or Cable Seal Fittings for Building Service and DWP Pull Boxes — **Detail 15** Scale: Not to Scale

Section:



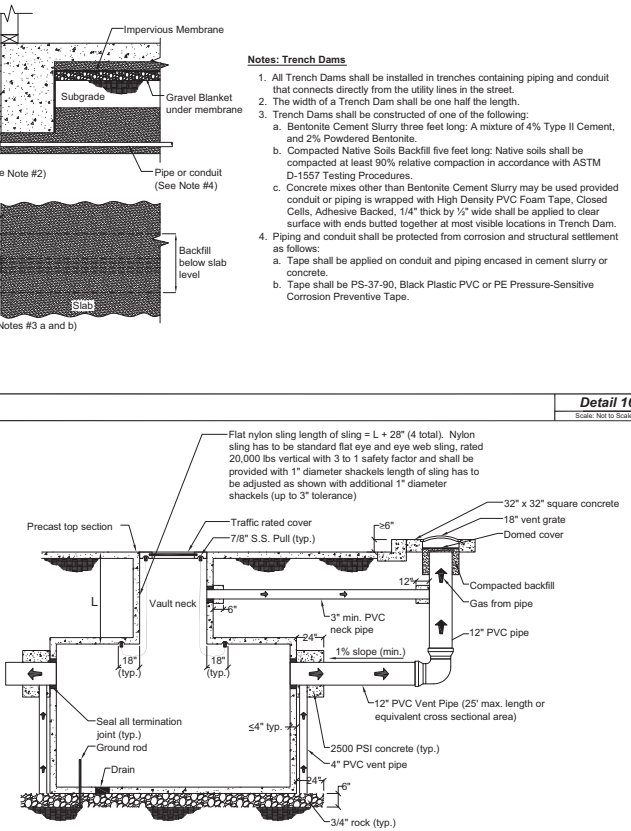
Plan View:



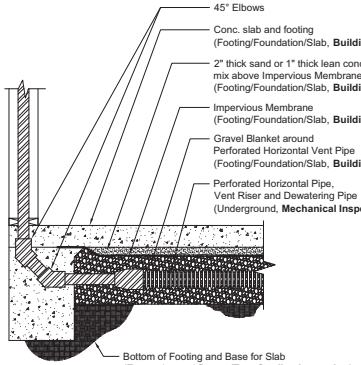
Notes: Trench Dams

1. All Trench Dams shall be installed in trenches containing piping and conduit that connects directly from the utility lines in the street.
2. The width of a Trench Dam shall be one half the length.
3. Trench Dams shall be constructed of one of the following:
   a. Bentonite Cement Slurry three feet long: A mixture of 4% Type II Cement, and 2% Powdered Bentonite.
   b. Compacted Native Soils Backfill five feet long: Native soils shall be compacted at least 90% relative compaction in accordance with ASTM D-1557 Testing Procedures.
   c. Concrete mixes other than Bentonite Cement Slurry may be used provided conduit or piping is wrapped with High Density PVC Foam Tape, Closed Cells, Adhesive Backed, 1/4" thick by ½" wide shall be applied to clear surface with ends butted together at most visible locations in Trench Dam.
4. Piping and conduit shall be protected from corrosion and structural settlement as follows:
   a. Tape shall be applied on conduit and piping encased in cement slurry or concrete.
   b. Tape shall be PS-37-90, Black Plastic PVC or PE Pressure-Sensitive Corrosion Preventive Tape.

Trench Dam — **Detail 16** Scale: Not to Scale



Large Underground Electrical Equipment Enclosures — **Detail 18** Scale: Not to Scale



Inspection (Request inspection using the terminologies shown in this detail) — **Detail 17** Scale: Not to Scale

SITE ADDRESS:
LEGAL DESCRIPTION:
OWNER:

STANDARD PLAN:
METHANE HAZARD MITIGATION
Not to be used for Playa Vista Phase I Projects

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Exhibit 2 Los Angeles County Methane Ordinance

COUNTY OF LOS ANGELES
2008 BUILDING CODE

Adopting by reference
Portions of the 2001 Edition

CALIFORNIA BUILDING CODE
Volume 1

TITLE 26
of the Los Angeles County Code
As amended by Ordinance No. 2002-0076
Effective November 1, 2002

Official Compilation

Edited and Proofread by Building and Safety Division,
Department of Public Works, County of Los Angeles

Last Updated 04/09/2015

110.3 Fills Containing Decomposable Material. Permits shall not be issued for buildings or structures regulated by this Code within 1,000 feet (304.8 m) of fills containing rubbish or other decomposable material unless the fill is isolated by approved natural or artificial protective systems or unless designed according to the recommendation containing in a report prepared by a licensed civil engineer. Such report shall contain a description of the investigation, study and recommendation to minimize the possible intrusion, and to prevent the accumulation of explosive concentrations of decomposition gases within or under enclosed portions of such building or structure. At the time of the final inspection, the civil engineer shall furnish a signed statement attesting that the building or structure has been constructed in accordance with the civil engineer's recommendations as to decomposition gases required herein.

Buildings or structures regulated by this Code shall not be constructed on fills containing rubbish or other decomposable material unless provision is made to prevent damage to structure, floors, underground piping and utilities due to uneven settlement of the fill. One-story light-frame accessory structures not exceeding 400 square feet (37.2 m^2) in area or 12 feet (3658 mm) in height may be constructed without special provision for foundation stability.

110.4 Methane Gas Hazards. Permits shall not be issued for new buildings or enclosed structures regulated by this Code on, adjacent to, or within 300 feet (91.44 m) of active, abandoned or idle oil or gas well(s) unless designed according to recommendations contained in a report prepared by a registered design professional, such as a licensed civil engineer and/or licensed petroleum engineer, to evaluate whether such wells are being properly operated or maintained, or are abandoned. No permits shall be issued until documentation of proper operation, maintenance, or abandonment or reabandonment is submitted to and approved by the Building Official.

> **Exception:** When approved by the Building Official, mitigation of methane gas hazards shall not be required for additions or alterations to existing buildings or structures located no closer than 200 feet (60.96 m) to active, abandoned or idle oil or gas well(s).

As used in this section, "well" shall mean any well as defined by Section 3008, Subdivisions (a), (b), and (c) of the California Public Resources Code.

LANDFILL GAS ASSESSMENT AND MANAGEMENT
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
LANDFILL GAS PROTECTION POLICY

Background

Decades ago, most citizens in Los Angeles County used backyard incinerators to get rid of their trash. Open burning was also considered an acceptable practice at a majority of the landfills. With the deterioration of air quality in the Los Angeles Basin during 1950s, the County Board of Supervisors adopted an ordinance prohibiting backyard burners and open burning at all landfills. As a result of this prohibition, the County was faced with a shortage of landfill capacity. During the same period, many depleted gravel pits were left open with no ultimate use as a result of sand quarry operation. In order to utilize these pits and provide for landfill capacity, it was decided that these pits should be used for disposal of municipal solid waste.

The first indication of possible problems surfaced around 1965 when residents adjacent to these pits complained of odor. The problem was brought home when children were injured while playing with matches and the trapped air exploded near one of these pits.

In order to address these problems and to formulate construction criteria for sanitary landfills and improvements which would lead to optimum land development and maximum use, in 1967, the County received a grant from the U.S. Environmental Protection Agency (formerly the Department of Health, Education and Welfare) to conduct a three-year study. Among other things, the information gathered during the three-year period was used to develop criteria for the safe construction of buildings on, in, or adjacent to sanitary landfills.

The study found the presence of methane gas as far away as several hundred feet. As such, it became obvious that there is a need to prevent the migration of landfill gas into structures and that the issue be addressed prior to the issuance of any building permits. Accordingly, the County Building Code was revised in 1975 to prohibit construction of any structure on or within 1,000 feet of a landfill containing decomposable material unless the fill is isolated by an approved natural or man-made protection system or designed according to the recommendations contained in a report prepared by a California Registered Civil Engineer.

This report is to contain a description of the site investigation, as well as recommendations to minimize any possible intrusion of landfill gases and to prevent the accumulation of explosive concentrations of decomposition gases within or under enclosed portions of the building or structure.

The Los Angeles County Department of Public Works is the Building Official for the unincorporated areas of the County and 19 contract cities. Our Department is therefore responsible for ensuring the safety of the buildings and their occupants.

I. LANDFILL GAS PROTECTION SYSTEM

Should a determination be made that gas generation/migration exists at a site and a methane gas protection system becomes necessary, the following is required:

a. A gas control system,
b. A gas monitoring system,
c. A gas monitoring program,
d. A contingency plan, and
e. A covenant and agreement.

A. GAS CONTROL SYSTEM

In general, there are two types of gas control systems: passive or active.

1. Passive system

A passive system consists of two components. First there is the membrane sheeting which is placed beneath the structure=s slab and foundation and is to totally encapsulate the underground portions of the building. The purpose of the membrane is to prevent intrusion of gases into the building. In addition, there is the gravel filled ventilation trench system to collect and remove the landfill gases. This system mainly applies to structures constructed adjacent to or within a 1,000-foot radius from a landfill. (**Plate No. 1**)

2. Active system

The active system is a mechanical system which may consist of a series of extraction wells, injection wells, or cut off trenches that either removes landfill gases or directs gases away from the structures.

a. Gas Extraction Well System - this system is used to remove gases from a landfill. This system consists of a series of extraction wells, each generally of 24 inches in diameter, with a minimum depth equivalent to the lowest elevation of the refuse, a header pipe system and a vacuum pump/blower. Collected gases are either burned at a flare station or used at a resource recovery facility. (**Plate Nos. 2 and 3**)

b. Air Injection Well System - this system consists of a series of air injection wells, a header pipe system, and a blower to push gases away from the building. The system is constructed in natural ground to provide a barrier system between the building and the landfill. (**Plate Nos. 4 and 5**)

c. Cut off trenches - the cut off trenches are trenches dug as deep as the depth of the landfill. These are located in natural ground adjacent to the building. They are filled with gravel and are connected by a series of pipes to a blower or a vacuum pump. The system is maintained under pressure to either remove the collected landfill gases or to push them away from the building. (**Plate No. 5**)

In general, except for single-family residential development, all three types of active systems can be used as control systems for buildings adjacent to a landfill, but only the extraction well system is acceptable for protection of structures built directly on a landfill. (Note: Structures built on a landfill must also be provided with a membrane sheeting.)

B. GAS MONITORING SYSTEM

Except for single-family residential development, the County requires a monitoring system to be installed to substantiate the adequacy of the gas control system throughout the life of the project.

Depending on the type and location of a structure, a monitoring system may consist of a series of subslab monitoring probes, monitoring wells, automatic methane gas sensing devices or a combination of two or more of these systems.

In general, subslab monitoring probes are used in conjunction with a membrane. These probes are required to be installed both above and beneath the membrane to monitor the intrusion of landfill gases into the building as well as to verify the adequacy of the installed barrier system. (**Plate Nos. 1 and 6**)

Monitoring wells are used in conjunction with an active system and are required to be installed inside and outside of the building. A monitoring well may consist of one or several probes installed at various depths. Depending on the location, a monitoring well may be five feet (minimum) or may go as deep as 150 percent of the landfill depth. (**Plate Nos. 5, 6, and 7**)

The interior monitoring wells generally are for the detection of methane gas only, whereas the exterior monitoring wells may be used for the detection of methane gas and its rate of generation, temperature, oxygen, pressure, carbon dioxide/monoxide, etc.

The purpose of a monitoring well system is to ensure the effectiveness of the gas control system as well as its proper operation and maintenance.

The automatic methane gas sensing devices are generally installed inside the structure and are used in conjunction with an active system. The system may consist of one detector or several and is generally set to be activated when it detects methane gas in excess of 20 percent Lower Explosive Limit (LEL) in the atmosphere.

In general, the type of monitoring system selected will depend on the type of gas control system used. This will, in turn, determine the type of monitoring program that would be best suited to measure the effectiveness of the gas protection system and would also permit an evaluation of the system so as to enable the needed adjustments to be made.

C. GAS MONITORING PROGRAM

The gas monitoring program consists of two elements. One is to ensure the effectiveness of the gas control system in preventing methane gas intrusion into the structure. Two, in conjunction with the active system, is to ensure that the system is operating properly and maintained adequately.

1. Methane Gas Monitoring Program

The purpose of the methane gas monitoring program is to test for the presence of methane gas and the effectiveness of the gas protection system. The monitoring schedule required by the County is as follows:

- Test all monitoring probes prior to occupancy (All developments)
- Test monthly for three months after the building occupancy (except for single-family residential developments)
- Test quarterly thereafter (except single-family residential developments)

In addition, the initial test results must be submitted prior to granting occupancy to the building.

The frequency of monitoring for the gas control system and its proper operation depends on the type of active gas control system employed. Parameters to be checked and frequency of monitoring are to be specified in the Operation and Maintenance Plan submitted by the design engineer, and as approved by the County.

D. CONTINGENCY PLAN

In general, the County requires a contingency plan should the landfill gas protection system fail to effectively prevent intrusion of landfill gases into a structure or fail to effectively serve its purpose. The type of contingency plan required depends on the type of gas control system, building type, type of occupancy, and the site location. In general, the contingency plan is initiated when one or more of the following happens:

- Methane gas in excess of a preestablished concentration is detected in a probe above the membrane or in an interior monitoring well.

- Methane gas in excess of 20 percent LEL is detected in the interior room atmosphere.

- There is an indication of possible underground landfill fire.

- Air and/or landfill gas movement is detected beyond the site property line in conjunction with an air injection system.

There are other parameters which may trigger the implementation of a contingency plan. However, this will depend on the type of gas control system used and is beyond the scope of this paper.

E. COVENANT AND AGREEMENT

In order to alert future owners of potential landfill gas problems, prior to the approval of the building occupancy, the County requires that the property owner sign a Covenant and Agreement for himself/herself, future successor and heirs, and record the said agreement with the County Recorder Office. Depending on the site location and the type of gas control system used, the Covenant and Agreement will include the following:

1. A legal description of the property.

2. An acknowledgment that the building is constructed on or within 1,000 feet of a landfill containing decomposable materials/wastes.

3. A statement that a landfill gas protection system has been installed in accordance with plans and specifications approved by the Building Official of the County of Los Angeles.

4. A statement that the said system must be monitored, operated, and maintained in accordance with the approved plans and specifications.

5. A statement that gives its irrevocable permission to the County of Los Angeles or its authorized agent to enter the said premises during business hours for the purpose of methane gas monitoring.

II. DESIGN ENGINEER AND HIS/HER RESPONSIBILITIES

A landfill gas protection system must be designed by a California registered civil engineer who is knowledgeable in this field. The system must be constructed and installed under his/her direct supervision.

Prior to the construction and installation of the system, plans and specifications must be approved by the County. However, the County does not inspect the construction and installation of the system; this responsibility is vested in the design engineer. As a result of this policy, the engineer is required to submit a certification to the County prior to approval of the building occupancy stating the following:

A. I am a registered civil engineer in the State of California and that I am knowledgeable in the field of landfill gas control protection system.

B. The landfill gas control facilities have been constructed and installed under my direct supervision and in accordance with the approved plans and specifications (a copy of the As-Built plans must be enclosed).

C. The building is free from methane gas and can be safely occupied (a copy of the test results must be enclosed).

III. GENERAL CONSTRUCTION REQUIREMENTS

A. Design and construction plans must inform the construction workers that they may be subject to exposure to landfill gases. Specific details and precautionary instructions must be provided on the plans to eliminate/reduce the possibility of explosion and to reduce workers= exposure to toxic gases so that their health and safety are protected at all times.

B. Design and construction plans must be sufficiently detailed so that no decision is left to the contractor or his/her workers.

C. Materials specifications must be clearly called out on the design plans and specifications.

IV. MEMBRANE INSTALLATION

The proper installation of the membrane is of the utmost importance. A membrane system is effective only if it is installed properly. As a result, it is essential for the construction worker to recognize the importance of the system and the fact that the membrane=s function is not to serve as a moisture barrier system. The following are some tips as to how to ensure its proper installation (**Plate Nos. 1, 8, and 9**):

A. The design and construction plans must specify that all membrane installation shall be performed by a qualified firm with extensive experience in the installation of the membrane specified. (This should be verified by the design engineer.)

B. The design plans and specifications must show all requirements for ground preparation prior to the installation of the membrane. This is to ensure protection of the membrane during the construction phase.

C. The number of field joints must be kept to a minimum. In order to accomplish this, it is recommended that prefabricated sections be used under the footings (or wherever else that can be utilized). (**Plate No. 8**)

In general, all jointing between membrane layers must overlap a minimum of three inches and must provide a chemical bond. Jointing between membrane and other surfaces of different materials must provide for physical bond, and must have contact surface of six inches minimum.

D. The number of penetrations due to utility piping, etc., must be kept to a minimum and all penetrations must be sealed with a prefabricated boot. When possible, utility piping should be of the same material as the membrane. (**Plate No. 9**)

E. The membrane (HDPE or approved equal) must be a minimum of 60 mil in thickness and must be suitable for the purpose and compatible with the environment it is being exposed to. The membrane manufacturer must verify and certify the permeability, tensile strength and compatibility of the material with common constituents of landfill gases.

F. The County requires placement of clean sand both above and beneath the membrane. The sand layer must be a minimum of two inches in thickness. The purpose of the sand layer is 1) to protect the membrane against physical damage during construction, and 2) to provide a media where landfill gas movement can be detected. (**Plate No. 1**)

G. The plans and specifications must show sufficient detail of how the membrane is to be installed below the foundations and how the membrane is to be protected during construction of foundation frame, placement of reinforcing bars, and the pouring of concrete.

H. Lastly, plans and specifications must provide for the installation of signs inside the building informing the occupants that the building is provided with a subslab methane gas barrier system and that no floor penetration is allowed without written approval of the County Building Official.

V. MONITORING PROBE REQUIREMENTS

A methane gas monitoring system must incorporate the following:

Probes must be placed both above and below membrane (except for structures located directly on the landfill) and must be located in sand layers terminating at a monitoring station. (**Plate No. 1**)

The probe=s monitoring end must be 12 inches in length, 2 inch in diameter, perforated and wrapped with burlap, fiber glass or similar material to prevent the holes from clogging. (**Plate No. 6**)

The sampling end of each probe at the monitoring station must be provided with a valve and a 1/4-inch rubber hose connection. The valves must be identified as to their locations/depth and must be numbered. (**Plate Nos. 1 and 7**)

When applicable, a sign must be posted adjacent to each monitoring station stating AMethane Gas Monitoring Station - Do Not Block@. The words are to be in white letters, a minimum of 3/4 inch high and placed on a red background, a minimum of five feet above the floor.

The construction details for probes within a monitoring well are similar to those discussed above.

The number and location of monitoring probes/wells depends on the type of gas control system, the size of the building, type of occupancy and foundation. However, in the case of buildings, for each area beneath the slab that has been isolated by a continuous footing, the area must be provided with one probe above and one below the membrane.

VI. VENTILATION TRENCHES FOR A PASSIVE GAS CONTROL SYSTEM

Ventilation trenches must be no further than 50 feet apart or 25 feet from the building foundation and should be provided for each area isolated by a continuous footing. These trenches are to be a minimum of 12 x 12 inches. (**Plate No. 1**)

All ventilation trenches must be provided with a perforated pipe, minimum of 2 inches in diameter with a minimum of 2 percent of the pipe surface area. In addition no perforation is allowed within 12 inches of any foundation.

All perforated pipe must be connected to vertical ventilation pipe. Vertical ventilation pipes must be provided for every 400 feet of ventilation trench or at each end of the trench, whichever is least. However, in no case will there be less than two vertical ventilation pipes for each building. (**Plate No. 1**)

All vertical pipes must be protected against physical and chemical damage and must be of metal type when it is used inside a wall. All vertical ventilation pipes must also be terminated at a minimum of two feet above the highest point on the roof within a 10 foot radius of the vent pipe and away from sources of ignition. (**Plate No. 1**)

The top end of the venting pipe must be provided with a tee or other approved device that will prevent rainwater from entering the pipe.

VII. ACTIVE SYSTEM: EXTRACTION WELLS, AIR INJECTION WELLS OR CUT OFF TRENCHES

A. The engineer must submit design calculations, soil analyses and boring logs to the County for review and approval. These calculations must show that the system will provide a continuous curtain to prevent the migration of landfill gases beyond it.

B. In case of an Air Injection System or positive pressure cut off trench, the engineer must show sufficient data, verified by field testing, that no air is entering into the landfill and that no differential pressure is detected at the site property lines. (**Plate No. 5**)

C. With an Active System, the County will not issue a building occupancy permit until such time as the system is put into operation and is serving its purpose as designed, verified by field testing.

D. With an Extraction Well System, gas condensation may not be returned to the landfill unless approved otherwise by the State Water Resources Control Board.

E. An operation and maintenance manual must be provided to the County for review and approval prior to acceptance of the installed system by the County.

CR:my

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
ENVIRONMENTAL PROGRAMS DIVISION

Methane Gas Plan Protection System Checklist

Effective immediately, the following items must be submitted to this office for all plan check reviews:

- Three sets of methane plans, wet stamped and signed by a California Registered Civil Engineer, are required for review and approval. In addition, a copy of the paid Building and Safety fees must be submitted for the review process to commence. Lastly, the electrical plans for this project must be submitted to our division and will be reviewed by the Building and Safety Division, Electrical Section.

- One set of wet stamped architectural and structural plans must be submitted. This requires only the submittal of the cover sheet of the architectural and structural plans, with a note referencing to the methane gas plans, acknowledging the presence of a gas control system. This note should be easily detected (i.e. - bold print, cap lettering, bigger font, etc.) The following notes should be stated on the respective plans:

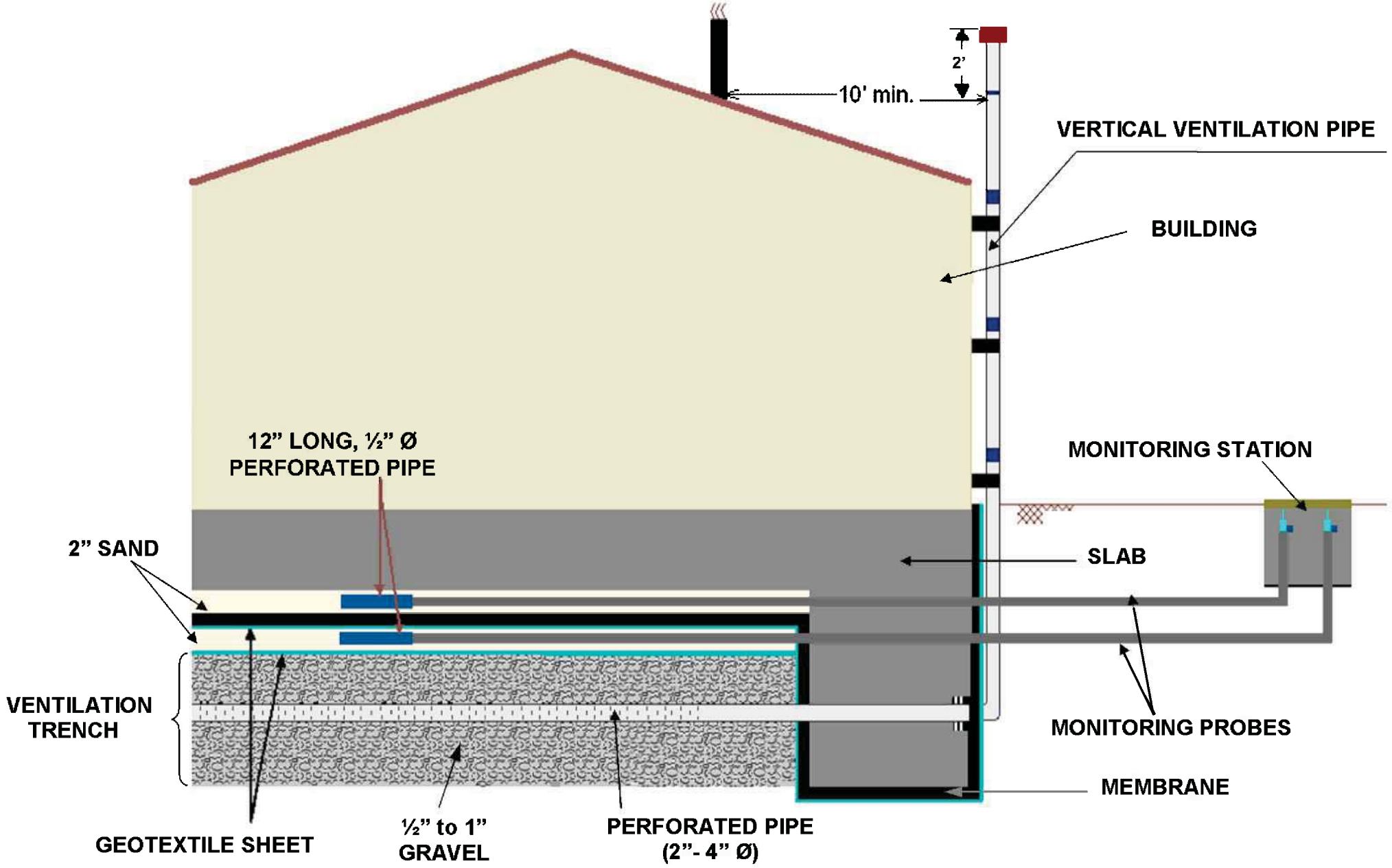
  "The undersigned project structural engineer acknowledges the presence of a methane gas protection system under the structure. Said system has been designed by "enter structural firm name here" and reviewed and approved by the County of Los Angeles. No coring, cutting, drilling or other penetrations of the structure shall be done without the prior written approval of the Building Official of the County of Los Angeles."

  "The undersigned project architect acknowledges the presence of a methane gas protection system under the structure. Said system has been designed by "enter architect firm name here" and reviewed and approved by the County of Los Angeles. No coring, cutting, drilling or other penetrations of the structure shall be done without the prior written approval of the Building Official of the County of Los Angeles."

- For all methane gas protection systems, final approval will be granted by the Environmental Programs Division. For all electrical installations, including soil classification, the Building and Safety Division, Electrical Section will grant final approval.

- The County of Los Angeles has approved the following methane gas protection membrane barrier materials:
  - Liquid Boot (100 dry mils)
  - Liquid Boot PLUS (60 dry mils plus 20 mils LLDPE, 80 mils total)
  - Geo-Seal (80 dry mils)
  - VaporLock-m (80 dry mils)
  - HDPE (60 dry mils)

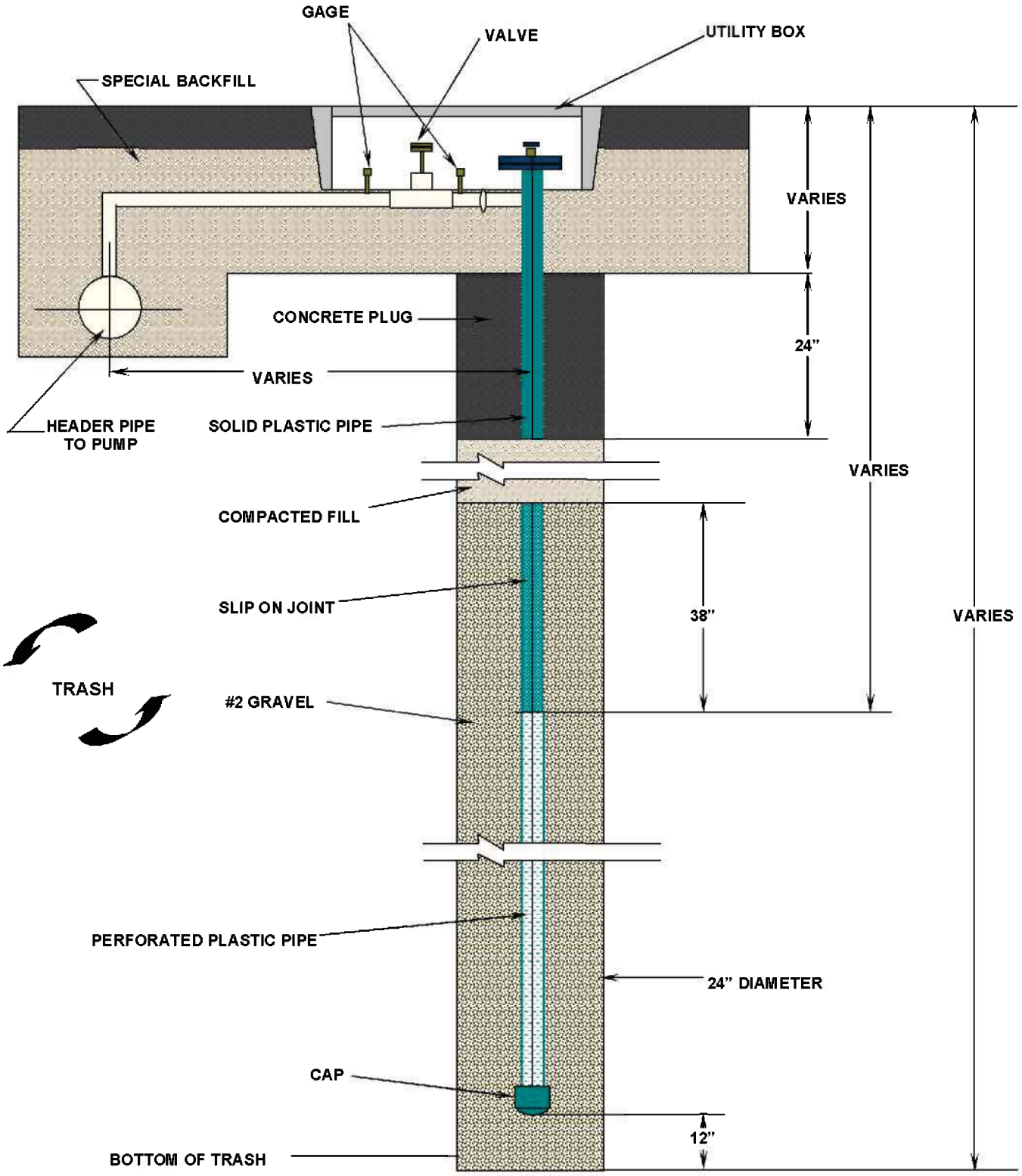
If you have any further questions on this matter, please contact Mr. Wu Tan at (626) 458-2193.



METHANE GAS CONTROL SYSTEM
PASSIVE SYSTEM

NTS

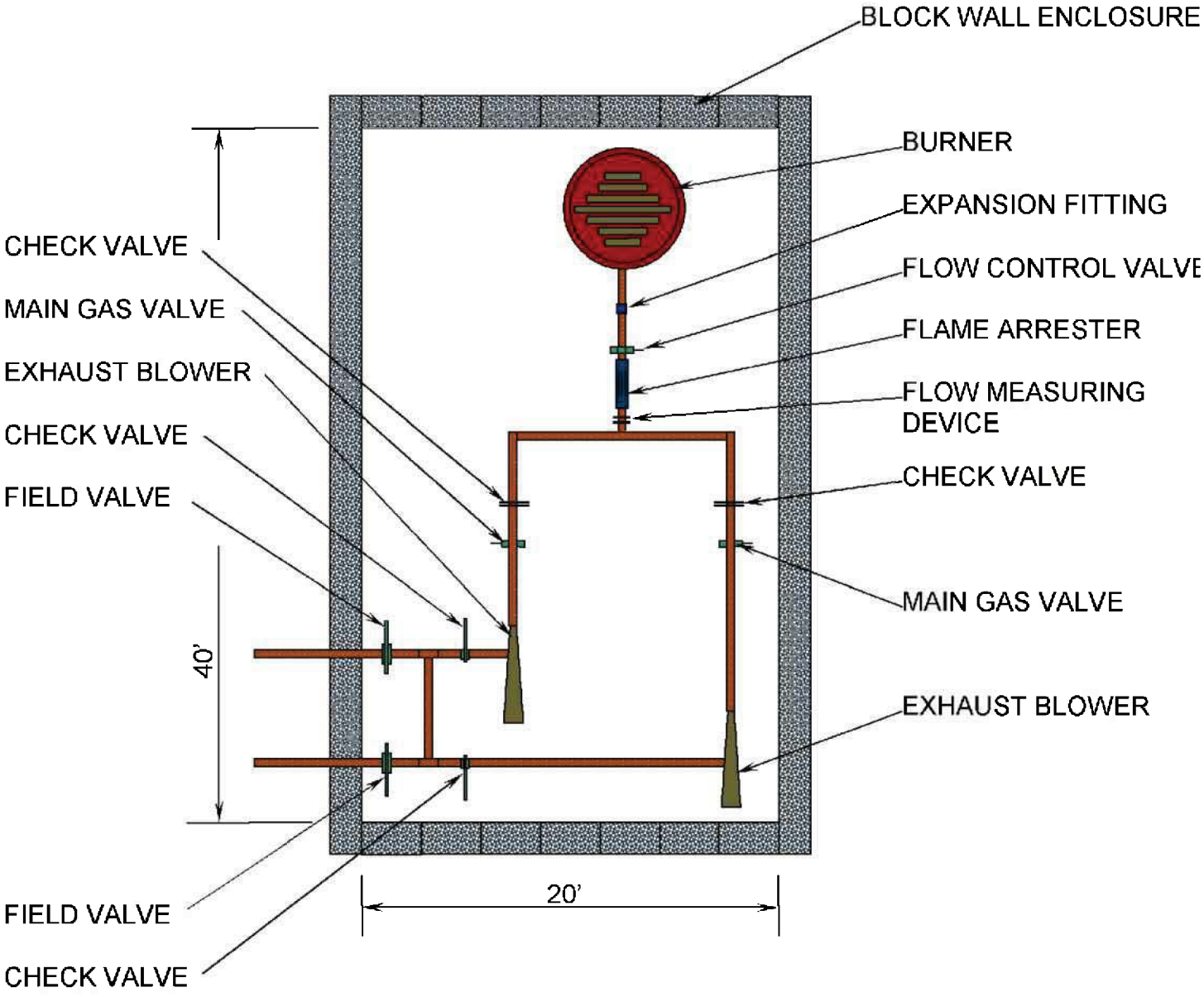
PLATE 1



GAS EXTRACTION WELL

(NOT TO SCALE)

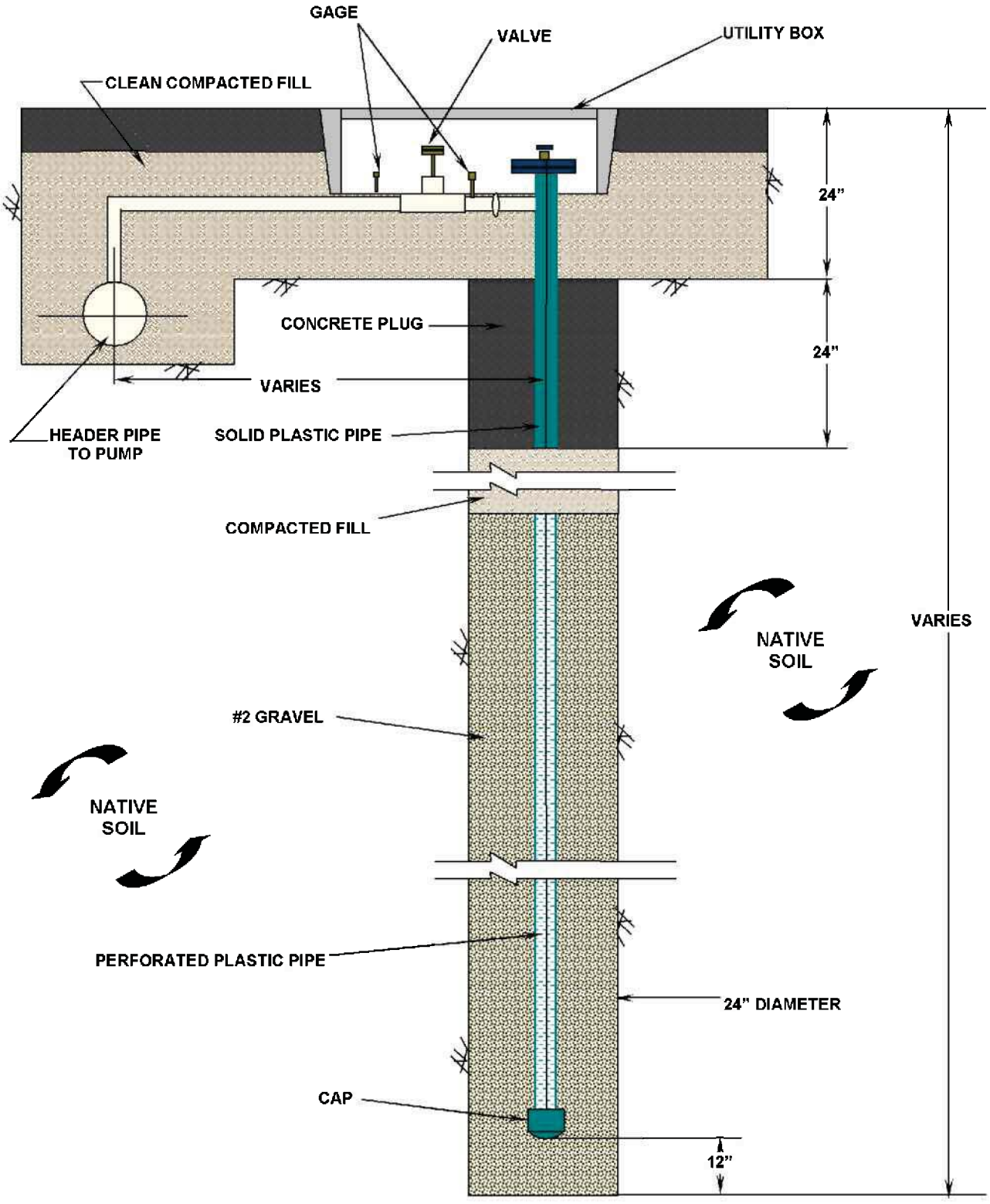
PLATE 2



EXTRACTION SYSTEM BURNER STATION

(NOT TO SCALE)

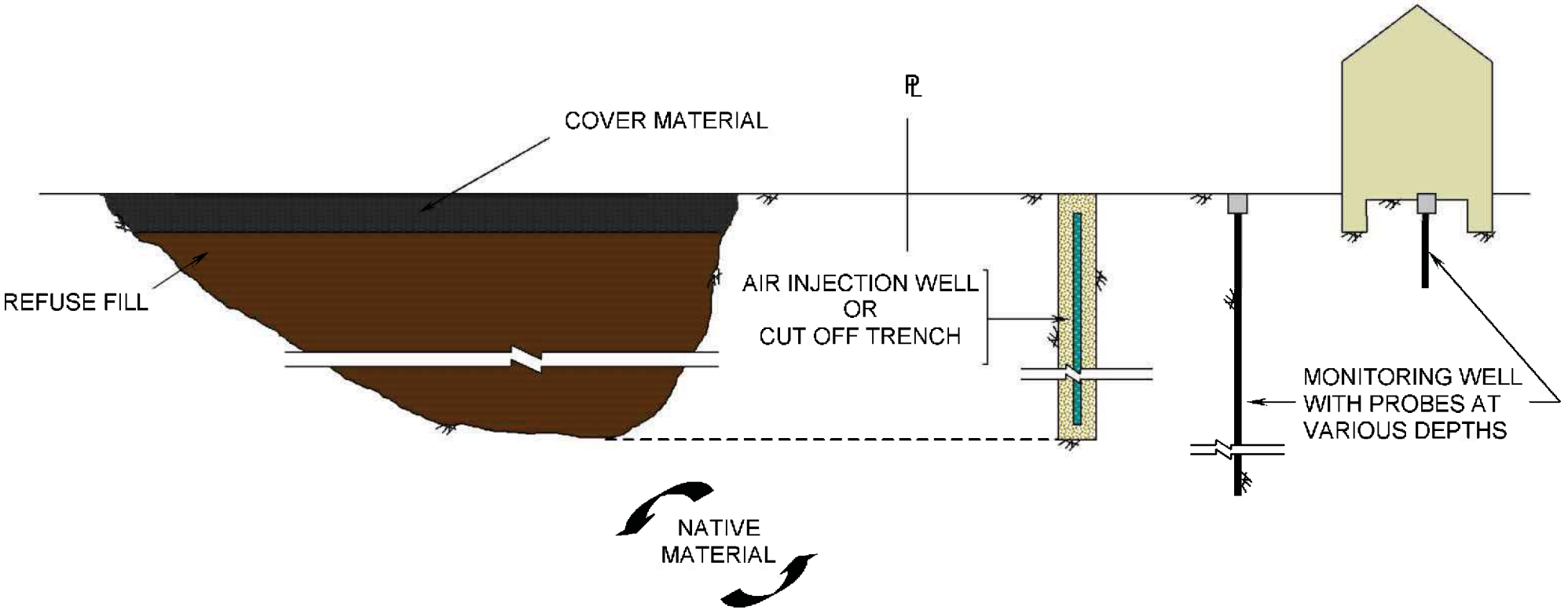
PLATE 3



AIR INJECTION WELL

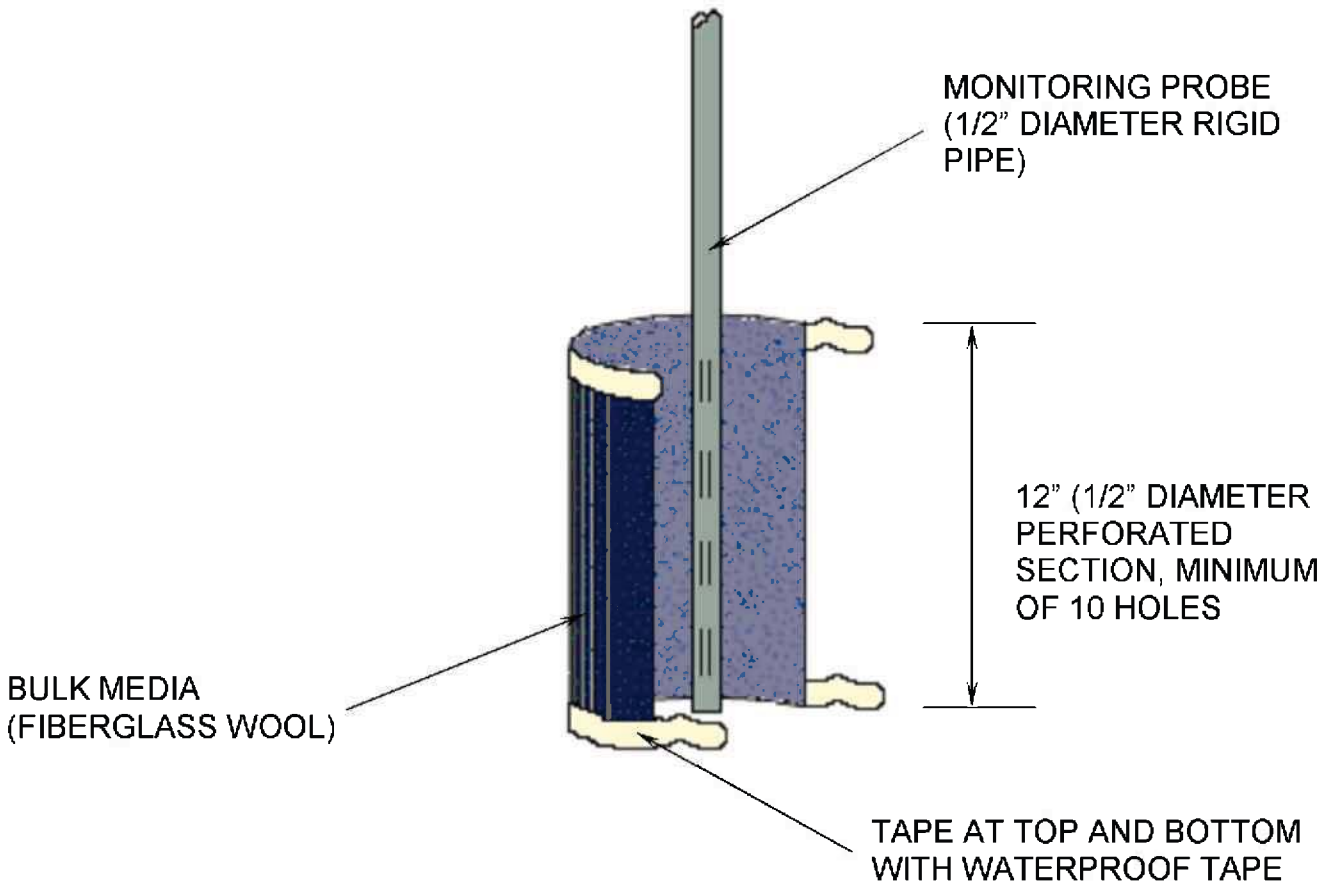
(NOT TO SCALE)

PLATE 4



AIR INJECTION OR CUT OFF TRENCH SYSTEM

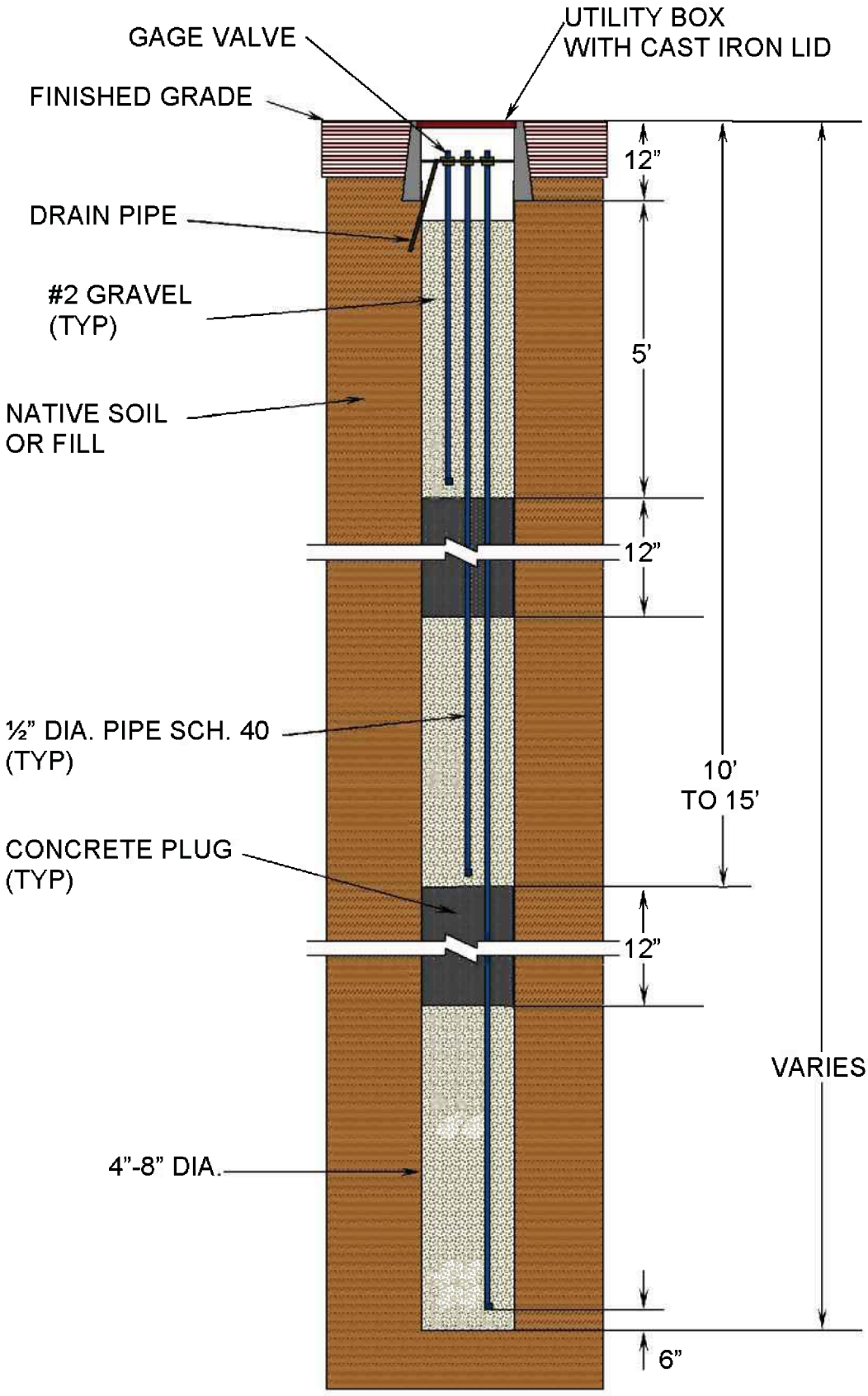
PLATE 5



TYPICAL PROBE AND DETAIL

(NOT TO SCALE)

PLATE 6

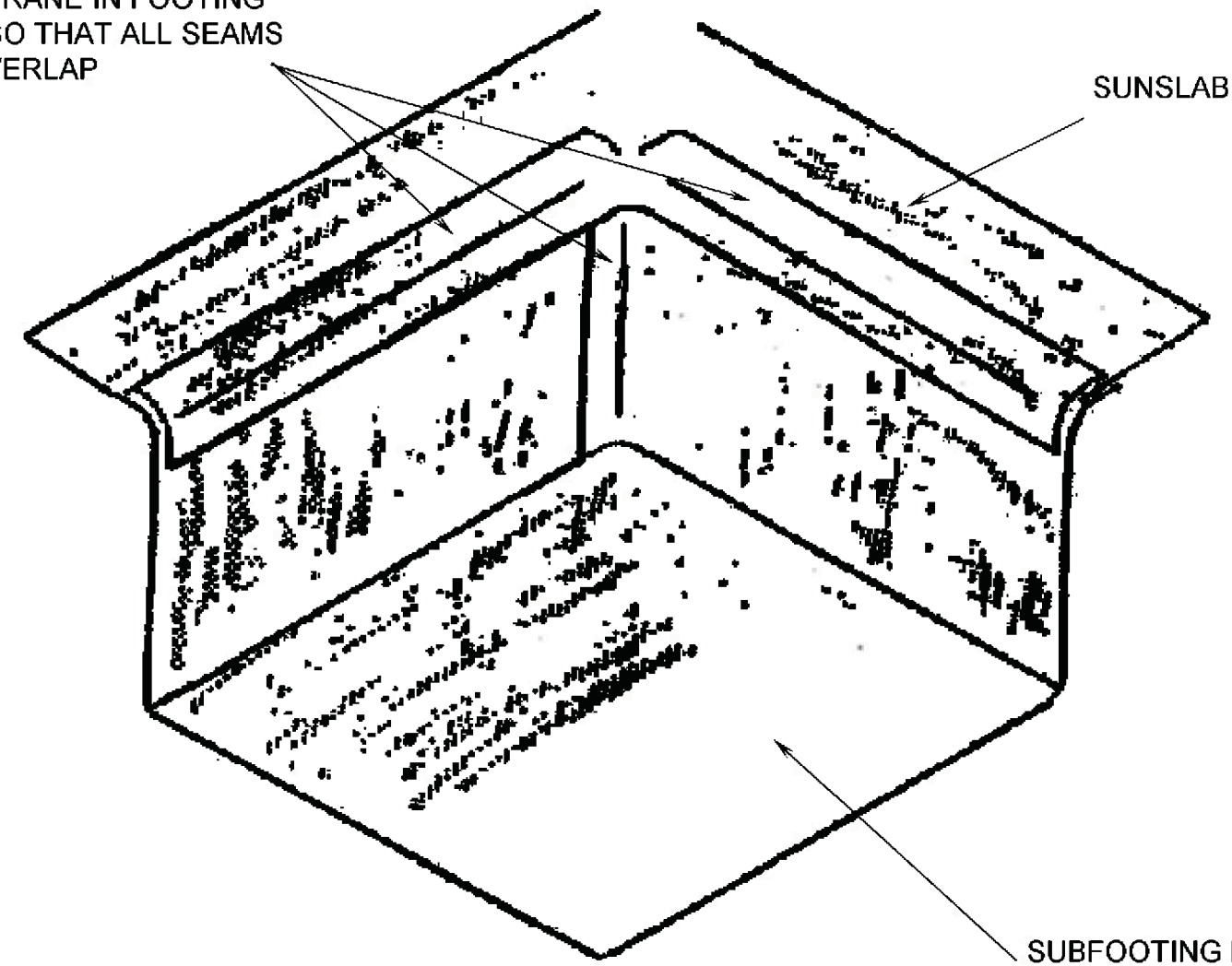


MONITORING WELL

(NOT TO SCALE)

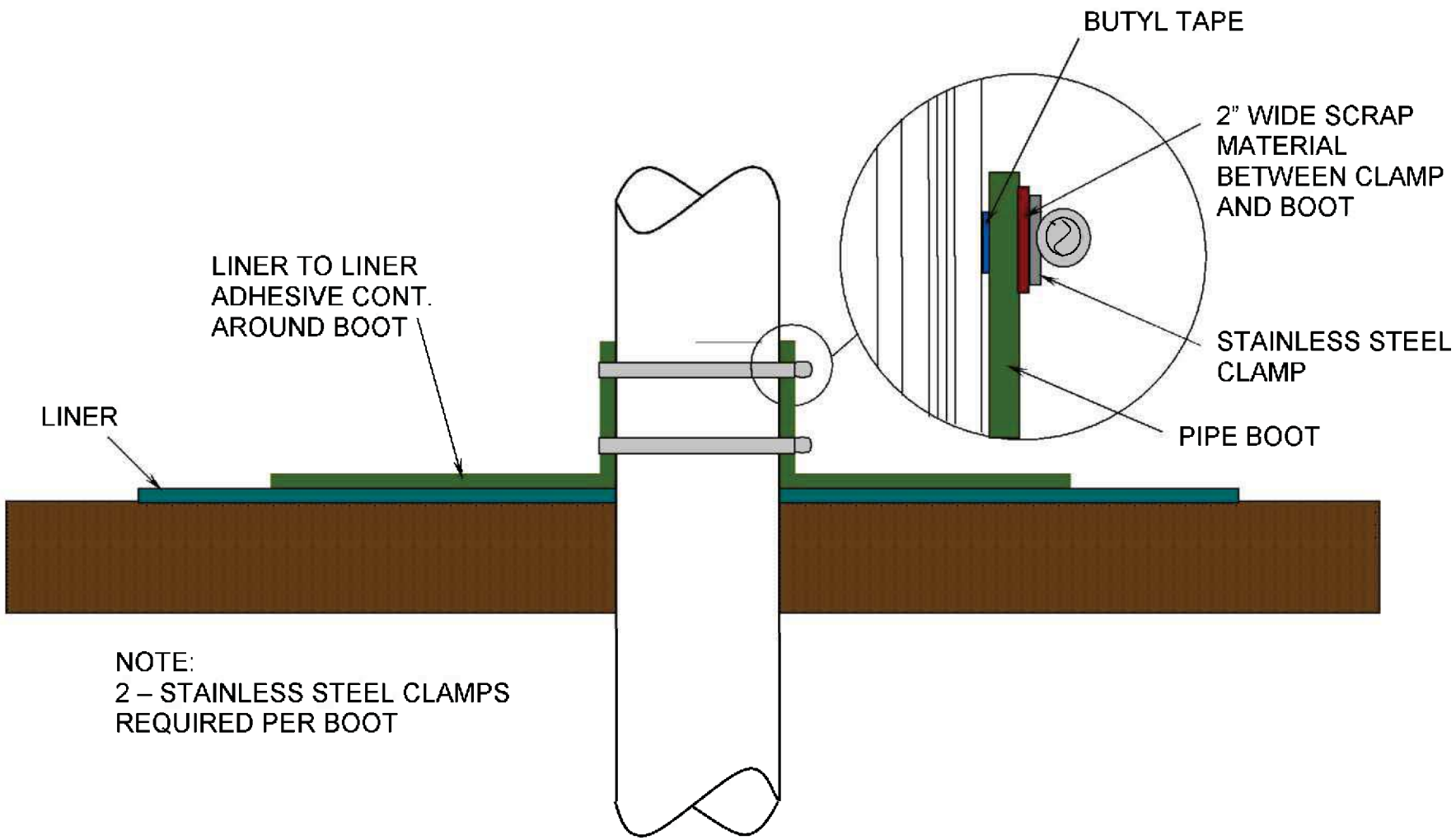
PLATE 7

INSTALL MEMBRANE IN FOOTING EXCAVATION SO THAT ALL SEAMS ARE 6" MIN. OVERLAP



MEMBRANE

PLATE 8



PREFABRICATED PIPE BOOT

(NOT TO SCALE)

COLLAR WIDTH = PIPE O.D. + 12" (MIN.)
RISER 6" (MIN.)

PLATE 9

CONSULTANTS DEALING WITH METHANE GAS MANAGEMENT

Consulting Firm	Contact Person	Address	Telephone/Fax Number
Advanced Construction Technologies	Scott Cole	77 Bunsen Irvine, CA 92618	(949) 502-5355 (949) 502-5356
Alta Environmental	Steve Ridenour	3777 Long Beach Blvd Long Beach, CA 90807	(310) 530-5006
Andersen Environmental	Jason Ironi	5261 West Imperial Highway Los Angeles, CA 90045	(310) 854-6300 (310) 854-0199
Brownfield Subslab	John Sepich	5655 Lindero Canyon Ste 106-3 Westlake, CA 93021	(213) 500-0425
Feffer Geological Consulting	Lorraine Parks	1990 S. Bundy Drive, Suite 400 Los Angeles, CA 90025	(310) 207-5048 (310) 826-0182
GC Environmental	Richard Prosser Dan Waineo	1230 N Jefferson St Ste J Anaheim CA 92804	(714) 632-9969 (714) 632-9968
GeoKinetics, Inc	Glenn Tofani	77 Bunsen Irvine, CA 92618	(949) 502-5353 (949) 502-5354
GeoScience Analytical Inc	Fleet Rust	608 Hailey Court Simi Valley, A 93065	(805) 526-6532 (805) 526-3570
GeoSyntec Consultants	Bert Palmer	2100 Main St #150 Huntington Beach, CA 92648	(714) 969-0800
Lofy Engineering	Ronald Lofy	PO Box 5335 Pasadena, CA 91117	(626) 351-2266
Methane Specialists	Chris Conahan Chris Tekatt	621 Via Alondra Ste 610 Camarillo, CA 93012	(805) 987-5356 (805) 987-3968
SCS Engineering	Michael P. Murphy	3900 Kilroy Airport Way, Ste 100 Long Beach, CA 90806-6816	(562) 426-9544 (562) 427-0805
Terra/Petra	Hugh B. Avery John Conaway	700 South Flower St Ste 2580 Los Angeles, CA 90017	(213) 458-0494
Tetra Tech BAS	G.E. Andraos	1360 Valley Vista Dr. Diamond Bar, CA 91765	(909) 860-7777 (909) 860-8017

APPENDIX A

COVENANT AND AGREEMENT FOR A PASSIVE SYSTEM

1. The owner of the property described below acknowledges for himself, his heirs, successors in interest or assigns the following:

    a. That the building is constructed within 1,000 feet of a landfill containing decomposable material and is subject to methane gas intrusion from the underlying soil.

    b. That a methane gas control system, approved and on file with the Building Official of the County of Los Angeles/City of _____ has been installed on the property.

    c. To give irrevocable consent to the County of Los Angeles/City of ____ to permit its authorized representatives to enter onto the said premises during regular business hours for the purpose of inspecting and testing for landfill gas intrusion.

2. Legal description of the property.

APPENDIX B

COVENANT AND AGREEMENT FOR AN ACTIVE SYSTEM

1. The owner of the property described below acknowledges for himself, his heirs, successors in interest or assigns the following:

    a. That the building is constructed within 1,000 feet of a landfill containing decomposable material and is subject to methane gas intrusion from the underlying soil.

    b. That a methane gas control system, approved and on file with the Building Official of the County of Los Angeles/City of _____ has been installed on the property.

    c. That the property owner will maintain and operate the system in accordance with requirements specified in the plans and Operation and Maintenance Manual, all as approved by the Building Official of the County of Los Angeles/City of _____.

    d. To give irrevocable consent to the County of Los Angeles/City of ____ to permit its authorized representatives to enter onto the said premises during regular business hours for the purpose of inspecting and testing for landfill gas intrusion.

2. Legal description of the property.

APPENDIX C

METHANE GAS CONTROL SYSTEM PLAN GENERAL NOTES

General Notes for All Methane Gas Control System Plans:

1. For commercial and industrial structures, indicate by general notes that:

   a. A monitoring program shall be established as follows:

      - Test priority to occupancy
      - Test monthly for three months
      - Test quarterly thereafter

   b. The initial test results shall be submitted prior to the granting of occupancy for the building.

   All test results shall be signed by a Civil Engineer registered in the State of California. Copies of all test results shall be provided to the County of Los Angeles Department of Public Works, Environmental Programs Division, and Building and Safety Division.

2. Prior approval of the installed methane gas control facilities or release of utilities by the inspecting authority, the Department of Public Works, Environmental Programs Division, and Building and Safety Division shall be provided with was-built plans and a written certification stating:

   a. The methane gas control facilities have been installed in accordance with the approved drawings.

   b. The building is free from methane gas and can be safely occupied.

   The certification and the as-built plans shall be signed by a Civil Engineer registered in the State of California.

3. Any trenching, excavation, or other work below grade is subject to methane gas infiltration from the soil which could create a potential hazard to personnel. Special safety precautions as outlined in the report/plans are to be employed during this work.

4. All necessary permits from regulatory agencies, including Federal, State, regional, and local, must be obtained prior to start of any construction work. If, as a result of any agency's requirements, changes are made to these plans and specifications, then approval must be obtained from the County of Los Angeles/City of _____ Building Official.

5. The contractor should notify the Los Angeles County Department of Public Works, Environmental Programs Division, at (626) 458-3517, two working days prior to the installation of the membrane.

APPENDIX D

CONSTRUCTION NOTES FOR MEMBRANE INSTALLATION

Membrane Installation:

1. All membrane installation shall be performed by a qualified firm with extensive experience in the installation of membrane specified.

2. Unless shown or noted otherwise, method of membrane installation, including jointing, seaming, and all other physical connections, shall be in accordance with the membrane manufacturer's recommendations.

3. All membrane field joints shall be overlapped and sealed a minimum of 3 inches. Unless shown otherwise, contact surface between membrane and any other surface shall not be less than 6 inches. All field joints shall be prepared over a smooth and hard surface.

   All penetrations through membrane shall be sealed per details shown on plans using prefabricated boot(s).

4. All surfaces shall be trimmed smooth to the exact contours and elevations shown on the drawings. All loose earth, cobbles, wire tracks, and other foreign matter shall be completely removed.

5. Any necessary repairs to the membrane shall be patched with the lining material itself, lap-jointed as specified herein.

6. Any future work that will result in penetration of the membrane will require a permit from the Building Official prior to final approval of the plans.

7. A warning sign shall be installed in a prominent location within the building. The sign shall include such information as follows:

   "**Warning:** A membrane is installed beneath the building floor slab to prevent methane gas intrusion from the soil. Any proposed penetration or alteration of the floor slab requires a permit to be obtained from the County of Los Angeles/City of _____ Building Official. It is illegal to remove this sign."

   The word "Warning" shall be in white letters, a minimum of 3/4 inch high, with the remainder 3/8 inch high and placed on red background.

8. All Federal, State, and local safety requirements shall be complied with.

9. All necessary permits from regulatory agencies, including Federal, State, regional, and local, must be obtained prior to start of any construction work. If, as a result of any agency's requirements, changes are made to these plans and specifications, then approval must also be obtained from the County of Los Angeles/City of _____ Building Official.

10. The contractor shall notify the Los Angeles Department of Public Works, Environmental Programs Division, at (626) 458-3517, two working days prior to the installation of the membrane.

APPENDIX E

MONITORING PROBE REQUIREMENTS

Gas Monitoring System

A methane gas monitoring system must incorporate the following:

1. Probes must be place both above and below the membrane. Probes must be located in the sand layers and must terminate at the monitoring station.

2. The monitoring probe must be 12 inches in length, 1/2 inch diameter, perforated, wrapped with burlap or similar materials, and connected to a 1/4 inch outside diameter tubing/piping which terminates at a monitoring station.

3. The sampling end of each probe (at the monitoring station) must be provided with a 1/4 inch cock valve with a 1/4 inch outside diameter, 1 inch long stub and should be located inside of a valve box or approved equal.

4. Each valve box should be of concrete body with cast-iron frame and cover. Each cock valve must be labeled accordingly as to its location, probe number, etc.

5. The word "Methane" must be cast on the valve box cover.

6. A sign must be posted adjacent to each monitoring stating "Methane Gas Monitoring Station – Do Not Block". The words must be in white letters, a minimum of 3/4 inch high and placed on a red background. The sign must be posted to the wall, a minimum of 5 feet above the floor and as close to the monitoring station as possible.

7. A probe must be provided for approximately every 625 feet of floor area.

APPENDIX F

VENTILATION SYSTEM REQUIREMENTS FOR A PASSIVE GAS CONTROL SYSTEM

1. Ventilation trenches must be no further than 50 feet apart or 25 feet from the building foundation. Ventilation trenches must be provided for each area isolated by a continuous footing.

2. The gravel trench is to be a minimum of 12 x 12 inches, ventilation pipe sizes varies from 2 to 4 inches.

3. Pipe perforations – Minimum of 5 percent of the surface area of the pipe. Perforations must be symmetrical around the pipe. Ends of the pipe are to be capped.

4. All horizontal ventilation pipes are to be located at the highest point of the vent trenches.

5. There must be 30 lb. roofing felt, or similar material, placed over the ventilation trench separating the sand layer and the gravel. The roofing felt must be extended a minimum of 6 inches on both sides over the width of the trench.

6. Vertical ventilation pipes must be provided for every 400 feet of ventilation trench or at each end of a trench, whichever is least.

7. All vertical ventilation pipes must be terminated at a minimum of two feet above the highest point on the roof within a 10 foot radius of the vent pipe and away from source(s) of ignition.

8. The top end of the venting pipe must be provided with a tee or other approved device that will prevent rainwater from entering the pipe.

9. Exterior vent pipes must be constructed of cast iron, ductile iron, or similar material, to protect against ultraviolet sunlight.

SPECIFICATIONS FOR THE USE OF LIQUID BOOT PRODUCT AS METHANE GAS PROTECTION BARRIER IN PROJECTS UNDER THE JURISDICTION OF THE COUNTY OF LOS ANGELES

At a minimum, all development projects where Liquid Boot application is proposed, shall be subject to the following installation and quality assurance/quality control conditions:

1. The chloroprene modified asphaltic emulation and catalyst (Liquid Boot) shall be supplied in clearly marked containers bearing the brand name and product identification. Both components shall be supplied by the same source manufacturer.

2. Liquid Boot must be spray-applied onto geotextile to a minimum thickness of 100 dry mils in accordance with the manufacturer's specifications.

3. The membrane must completely encapsulate the foundation, footings, and exterior walls located below grade.

4. The membrane must be sprayed by a manufacturer-approved applicator/contractor. A written statement or a certificate issued by the manufacturer stating that the applicator is an approved applicator is required prior to use of the product.

5. The following field tests must be performed in accordance with the Liquid Boot Field Installation and Repair Procedure specified by the manufacturer:

   a) Thickness Sample Test at every 500 square feet.
   b) Smoke Test for each single-family dwelling.

6. All surfaces where the membrane is to be applied must be free of laitance, sharp projections, oil, dirt, or other contaminants. All such surfaces must be prepared in accordance with the manufacturer's instructions.

7. Prior to placing the concrete slab over the membrane, the membrane installer shall certify the membrane to be installed and tested in accordance with the manufacturer's specifications and to be free of leaks.

8. Under the concrete slab, the membrane must be overlaid with a minimum of two inches of clean sand or other similar protective material as approved by this office.

9. A copy of the inspection log for the project must be submitted with the as-built plans to the Los Angeles County Department of Public Works, Building and Safety and Environmental Programs Divisions, including signature by a manufacturer-approved inspector.

10. A note must be added to all plans indicating that the consulting engineer must supervise the barrier's installation. Additionally, in the as-built plans, the consulting engineer must indicate with proper wet-ink signature and stamp that Liquid Boot was installed under his/her supervision.

11. The manufacturer's specifications and quality assurance/quality control recommendations must be included as General Notes in all design/construction plans proposing Liquid Boot as a methane gas barrier.

The plans must be prepared and submitted in accordance with the requirements of the County of Los Angeles Department of Public Works, Environmental Programs Division.

SPECIFICATIONS FOR THE USE OF VAPORLOCK-M APPLICATION AS METHANE GAS PROTECTION BARRIER IN PROJECTS UNDER THE JURISDICTION OF THE COUNTY OF LOS ANGELES

At a minimum, all development projects where VaporLock-m application is proposed shall be subject to the following installation and quality assurance/quality control conditions:

1. The polymer modified asphalt emulsion shall be supplied in clearly marked containers bearing the brand name and product identification.

2. VaporLock-m must be spray-applied onto geotextile to a minimum thickness of 80 dry Mils in accordance with the manufacturer's specifications.

3. The membrane must completely encapsulate the foundation, footings, and exterior walls located below grade.

4. The membrane must be sprayed by a manufacturer-approved applicator/contractor. A written statement or a certificate issued by the manufacturer stating that the applicator is an approved applicator is required prior to use of the product.

5. The following field tests must be performed in accordance with the VaporLock-m Field installation and Repair Procedure specified by the manufacturer:

   a) Thickness Sample Test at every 500 square feet
   b) Smoke Test for each isolated area.

6. All surfaces where the membrane is to be applied must be free of laitance, sharp projections, oil, dirt, or other contaminants. All such surfaces must be prepared in accordance with the manufacturer's instructions.

7. Prior to placing the concrete slab over the membrane, the membrane installer shall certify the membrane to be installed and tested in accordance with the manufacturer's specifications and to be free of leaks.

8. Under the concrete slab, the membrane must be overlaid with a minimum of two inches of clean sand or other similar material as approved by this office.

9. A copy of the inspection log for the project must be submitted with the as-built plans to the County of Los Angeles Department of Public Works, Building and Safety and Environmental Programs Divisions, including signature by a manufacturer-approved inspector.

10. A note must be added to all plans indicating that the consulting engineer must supervise the barrier's installation. Additionally, in the as-built plans, the consulting engineer must indicate with proper wet-ink signature and stamp that VaporLock-m was installed under his/her supervision.

11. The manufacturer's specifications and quality assurance/quality control recommendations must be included as General Notes in all design/construction plans proposing VaporLock-m as a methane gas barrier.

The plans must be prepared and submitted in accordance with the requirements of the County of Los Angeles Department of Public Works, Environmental Programs Division.

Exhibit 3 Methane Investigation Report

January 28, 2016
Job # J3133.r1

To: **Mr. Bryan LeRoy, Partner**
Manatt, Phelps & Phillips, LLC
11355 W. Olympic Blvd.
Beverly Hills, CA – 90210

$^{c}/_{o}$ Craig Lawson & Co., LLC
8758 Venice Blvd., Suite 200
Los Angeles, CA 90034

Attn: **Ms. Andie Adame, Senior Project Manager**

Tel: **310-838-2400 ext. 106**
Fax: **310-838-2424**
Email: **andie@craiglawson.com**

Subj: **Site Methane Investigation Report for:**

5905 W. Wilshire Blvd. Los Angeles, CA – 90036

METHANE
SPECIALISTS

621 Via Alondra
Suite 610
Camarillo, California 93012

TEL: 805.987.5356
FAX: 805.987.3968

methanespecialists.com

Methane Specialists is pleased to submit this report with the results of our subsurface methane investigation for the above mentioned project. The purpose of the investigation was to measure subsurface soil gas concentrations and pressures of methane at the subject site to determine site-specific methane mitigation requirements prescribed by the City of Los Angeles Department of Building and Safety (LADBS).

Project Information

As proposed, the project will include the construction of a new ''400,000 SF commercial building'' to be built ''one subterranean basement level'', on two separated parcels, that will be connected by a pedestrian over-crossing. The area to be developed is one very large, irregularly-shaped parcel, *north* of Wilshire Blvd., ***and*** one smaller, more regularly-shaped parcel, of approximately 88,000 SF, *south* of Wilshire Blvd. The north lot will be the site of the ''Museum Building'' while the south lot will be the site of the ''Ogden Parking Structure''.

This is a combined construction effort of building a Los Angeles *County* facility within the boundaries of the *City* of Los Angeles. This project will fully comply with the most stringent requirements of the Methane Code, as per it's Table A.

Refusal was *met* at various depths from greater than approximately 20 feet, below surface grade, (bsg), down to 28 feet, bsg, as shown on the attached boring logs. While drilling down to a depth of greater than approximately 20 to 30 feet, bsg, actual ground water was *not* encountered at any probeset. A geotechnical report was *not* provided to us before the writing of this report. Thus, the historical groundwater level at this location is conservatively assumed to be greater than 28 feet, bsg. This would be approximately greater than 28 feet below where an impermeable membrane *could* be required to be installed under a ground floor slab, at approximately 0' below surface grade (bsg). Current architectural sections show footings down at about 27', bsg.

The site *is* within an area which the City of Los Angeles designates as a *Methane* Zone.

Los Angeles Methane Requirements

Requirements for control of methane intrusion in the City of Los Angeles are specified in Division 71 of Article 1, Chapter IX of the Los Angeles Municipal Code ("Division 71"). Since the project is within the *Methane Zone*, the Los Angeles Department of Building and Safety does have authority to withhold permits for construction unless detailed plans for adequate protection against methane intrusion are submitted, if testing leads to methane mitigation being required.

Since the project is within the City of Los Angeles, the level of methane protection required depends upon the "design methane concentration," which is defined in Division 71 as "the highest concentration of methane gas found during site testing." Site testing is required to determine the design concentration, unless the developer accepts the most stringent methane mitigation requirements ("Level V"). If site testing is performed (e.g., to document that a lower level of mitigation is justified), then it must follow a protocol published by the Department of Building and Safety, "Site Testing Standards for Methane" (P/BC 2002-101, November 30, 2004).

P/BC 2002-101 prescribes a three-step process for methane evaluation:

(1) Scheduling site testing either before or 30 days after any site grading;
(2) Conducting shallow soil gas tests (not less than 4 feet, bsg); and
(3) Installing and using multiple-depth gas probe sets where the highest concentrations of soil gases are expected to be found

For the first step, site testing was scheduled for various dates from December 6, 2015 through January 28, 2016. Methane Specialists also notified Underground Service Alert of Southern California to mark the site for underground utilities, and the utilities were subsequently marked and cleared.

For the second step, P/BC 2002-101 requires one shallow sampling location for every 10,000 square feet, or portion thereof, of site area, with a minimum of two shallow soil gas probe locations. Since the site area is approximately 400,000 square feet, a minimum of forty (40) *shallow* sampling locations would be required.

The third step in the City's methane evaluation process is to collect a minimum of two samples at multiple depths, and at least one multiple-depth probeset per every 20,000 square feet, or portion thereof. Thus, the minimum of twenty (20) multiple-depth *deep* gas probe sets would be required.

Any reading of 12,500 ppm/v (25% LEL) mandates the *maximum* methane *mitigation* measures. Such readings were recorded in *both* parcels, so some of the superfluous probes were not installed.

Shallow Soil Gas Probe Testing

City Guidelines require that one shallow-depth probe be installed for every 10,000 square feet of site area where the highest concentration of soil gas is most likely to be found, with a minimum of two shallow gas probes, regardless of the total area of the site. Since the total square footage of the site is approximately 400,000 square feet, Methane Specialists commenced installation of a required minimum of forty (40) shallow methane probes at a depth of 4 feet, bsg.

The first twelve shallow gas probes, SP-1 through SP-12, were drilled and installed in the *south* parcel from December 6, 2015 through January 27, 2016. The first three shallow gas probes were similarly installed in the north parcel on December 27, 2015. Readings were made well above the maximum 12,500 ppm/v, in both lots, thereby rendering more drilling to be redundant and unnecessary. Any *one* such reading would mandate the maximum mitigation in that *one* lot.

In all cases, Methane Specialists used a direct-push drill rig to hydraulically drive a 1.50 inch rod into the ground to a depth of approximately 4 feet, bsg. A ¼" polyethylene probe was then inserted into the boreholes. Approximately six inches of sand was placed in the boreholes, above and below the probe, to provide a sampling area. Bentonite was then added to the top of each of the boreholes. A hydrated bentonite plug was then placed above the bentonite, in each borehole, to form a seal.

Shallow probe site *testing* was conducted from December 6, 2015, through January 28, 2016.

Multiple-Depth Gas Probe Set Testing

City Guidelines also require that one multiple-depth deep probe set be installed for every 20,000 square feet of site area where the highest concentration of soil gas is most likely to be found, with a minimum of two multiple-depth deep gas probe sets, regardless of the total area of the site. Since the total area of the site is approximately 400,000 square feet, Methane Specialists installed the first twelve (12) (DP-1 through DP-12) multiple-depth deep probesets in the *south* parcel from December 27, 2015 through January 23, 2016. Methane Specialists installed the first three (3) (DP-1 through DP-3), multiple-depth *deep* probesets in the north parcel also on December 27, 2015. Again, readings were made well above the maximum 12,500 ppm/v, in both lots, thereby rendering more drilling to be redundant and unnecessary.

The multiple-depth deep probes were also installed using direct-push drilling equipment in the same manner as were the shallow gas probes. The deep probes were installed as multiple well clusters down to greater than from 20, to 30, bsg, for DP-1 through DP-12, where refusal *was* met at each deep probeset location. Groundwater was *not* encountered down to various depths of from 20 feet, to 30 feet, bsg, of all DP-1 through DP-12. In all cases, at each probe depth, approximately twelve inches of sand was placed in the borehole around each of the probes. Each of the probe sand layers were separated by layers of bentonite, between the sampling elevations. A hydrated, bentonite, plug was then placed onto the top of each borehole to form a seal.

Multi-depth probe site *testing* was conducted on December 6, 2015 through December 28, 2016.

Sampling and Analysis

For field data sampling and analysis, Methane Specialists measured these probes for methane with a RKI Eagle portable, gas-sampling meter. The lower limit for reporting methane levels with the RKI Eagle is 500 ppmv (parts per million by volume). The RKI Eagle was calibrated against standard calibrant samples by trained Methane Specialists staff members. The probe pressures were all measured with a Dwyer Magnehelic Differential Pressure Gauge with a minimum scale division of 0.1 inch of water (H_2O).

Results of Shallow Gas Probe and Multiple-Depth Gas Probe Analysis

The attached Form 1 shows the results of the analysis of both the shallow, *and* the multiple, depth deep probe sets.

Recommendations

In summary, since this project *is* located in the Methane Zone, according to the LADBS Methane Code Table 1A (enclosed), very significant levels of methane were encountered while testing at this site. Therefore, according to Table 1A, for the *Methane* Zone, this project *does* fall under Design *Level V*, with less than 2 inches of water-column gas-pressure. Thus, as per said Methane Code Table 1A, this project *does require both* ***active*****, and** ***passive,*** methane mitigation systems.

Thus, the impact of said Table A methane mitigation measures will be to comply with the most stringent standards of both the City of Los Angeles, and of the County of Los Angeles, in order to minimize the risk of methane hazard, through the inclusion of:

- impervious membrane systems;
- passive sub-slab systems;
- mechanical extraction systems;
- gas detection systems;

- mechanical ventilation systems;
- alarm-and-control-panel systems,
- de-watering systems;
- trench dams;
- conduit or cable fittings;

as necessary and appropriate, in order to insure the methane safety of all people in both buildings.

Disclaimer

All discussion in this report is based on information provided by the client, as well as data and conditions, as they existed at the time and date of testing at the site. Should any detail, or condition, change from that original information, then, re-consideration of the conclusions in this report could become justified. Methane Specialists cannot be held accountable for the consequences of relevant information which was not previously provided. Nor can Methane Specialists be held accountable for the consequences of changes in the project scope, or of project site conditions.

This report has been prepared for the sole use of the client, exclusively, for the completion of the subject project, alone. No other application, or interpretation, of this report is to be granted, or implied, or otherwise made, without first obtaining direct, written permission, exclusively from Methane Specialists.

Respectfully,
Methane Specialists

Kirby N. Arriola, P.E. (C-31416)

INDEX OF ENCLOSURES

REFERENCES

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, 1998, California Oil and Gas Fields, Volumes I, II and III. Vol. I (1998), Vol. II (1992), Vol. III (1982). 1,472 pp. Salt Lake information pp. 442-447.

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, 2013. DOGGR Online Mapping System (DOMS). http://maps.conservation.ca.gov/doms/ Accesses 1 November 2013.

California Occupational Safety and Health Administration (Cal/OSHA), 2011, Pocket Guide for the Construction Industry, July, 2011.

Cal/OSHA, 2013. Table AC-1, Permissible Exposure Limits for Chemical Contaminants, available at: http://www.dir.ca.gov/title8/5155table_ac1.html

County of Los Angeles Building Code, 2008, (adopting by reference portions of the California Building Code, Volume 1, 2001), Title 26mof the Los Angeles County Code, as amended by Ordinance No. 2002-0076, effective November 1, 2002.

Los Angeles Department of Building and Safety (LADBS), 2003, Ordinance No. 175790, Division 71 Methane Seepage Regulations, Section 91.7103, Map A-20960, dated September 21, 2003.

Los Angeles Fire Department (LAFD), 2006. Chief's Regulation #4 Procedures: Testing of Fire Protection Equipment, Revision 02-28-06.

Los Angeles Municipal Code (LAMC), Building Code, Section 91.106.4.1 Article 1, Buildings [Building Code], Division 1, Administration, Section 91.106.4.1. Permit Issuance.

LAMC, Building Code, Article 1 Buildings [Building Code], Division 71, Methane Seepage Regulations, Section 91.106. Testing, Maintenance and Service

LAMC, Building Code, Division 71, Methane Seepage Regulations, Section 91.107. Emergency Procedures.

Los Angeles Department of Building and Safety

Parcel Profile - Report Date: 4/21/2016 8:42:10 AM

JOB ADDRESS(ES)

5801 W WILSHIRE BLVD, LOS ANGELES, CA 90036

5905 W WILSHIRE BLVD, LOS ANGELES, CA 90036

1. PARCEL LEGAL DESCRIPTION INFORMATION:

Tract:	TR 215
Block:	
Lot:	12
Arb:	3
Modifier:	FR
Map Reference Number for Tract Recordation:	M B 14-42/43
Parcel Identification Number:	135B177 424 (/OnlineServices/PermitReport/PermitResultsbyPin?pin=135B177%20%20%20424)

2. BASIC ZONING INFORMATION FOR PARCEL:

Alquist-Priolo Fault Zone:	NO
Area Planning Commission:	Central
Baseline Hillside Ordinance:	NO
Baseline Mansionization Ordinance:	NO
Certified Neighborhood Council:	Mid City West
Community Redevelopment Area:	NO
Council District:	4
District Map:	135B177
Flood Hazard Zone:	NO
Hillside Grading Area:	NO
Hillside Ordinance Area:	NO
LA Preliminary Fault Study Area: (/OnlineServices/PermitReport/DisplayPDF?path=LAPFRSA.pdf)	NO
Planning Area / Community Name:	Wilshire
Zone(s):	PF-1D

3. GEOGRAPHICALLY ORIENTED PARCEL INFORMATION:

500 Foot School Zone:	NO
Airport Hazard Area:	NO
Alley:	NO
Building and Safety Branch Office:	LA
Building Line Setback:	10
Census Tract:	2151.01
City Street R/W:	NO
City Walk R/W:	NO
Coastal Zone Conservation Act:	NO
Community Design Overlay District:	NO
Community Noise Equiv. Level:	NO
Compacted Filled Ground:	NO
Division of Land:	NO
Division of Land Exemption:	NO
Earthquake-Induced Landslide Area:	NO

Earthquake-Induced Liquefaction Area:	NO
Easement:	NO
Energy Zone:	9
Environmentally Sensitive Area:	NO
Fire District:	1 (w/in 100' of St.)
Front Yard Setback:	NO
Future Street:	NO
GPI Plan Route Office:	NO
High Wind Area:	NO
Highway Dedication:	NO
Hillside Street:	NO
Lot Cut Date:	NO
Lot Size:	NO
Lot Type:	NO
Methane Hazard Site:	Methane Zone
Nat. Water Course:	NO
Near Source Zone Distance:	3.1
Oil Well Area:	NO
Parcel Area (sqft):	1006496.60
Parcel Map Exemption:	NO
Parking District:	NO
Parking Layout:	NO
Private Street:	NO
Read Yard Setback:	NO
Side Yard Setback:	NO
Thomas Brothers Map Grid:	633-C2
	633-B2
Vacated Street/Alley:	NO
Vehicular Access Waived:	NO

4. CITY DOCUMENTS ASSOCIATED WITH PARCEL:

City Planning Case(s):	CPC-1986-823-GPC
	CPC-1995-148-GPC
	CPC-2014-3119-ZC-SN-CDO-MCUP-ZV-ZAI-SPR
Historical Cultural Monument:	CA-170
Ordinance:	ORD-165331-SA1432
	ORD-129944
	ORD-171043-SA180
	ORD-80695
	ORD-58482
	ORD-46250
	ORD-54822
Zoning Information File(s):	ZI-2410 Metro Westside Subway Extension Project
	ZI-1117 MTA Project
	ZI-2452 Transit Priority Area in the City of Los Angeles

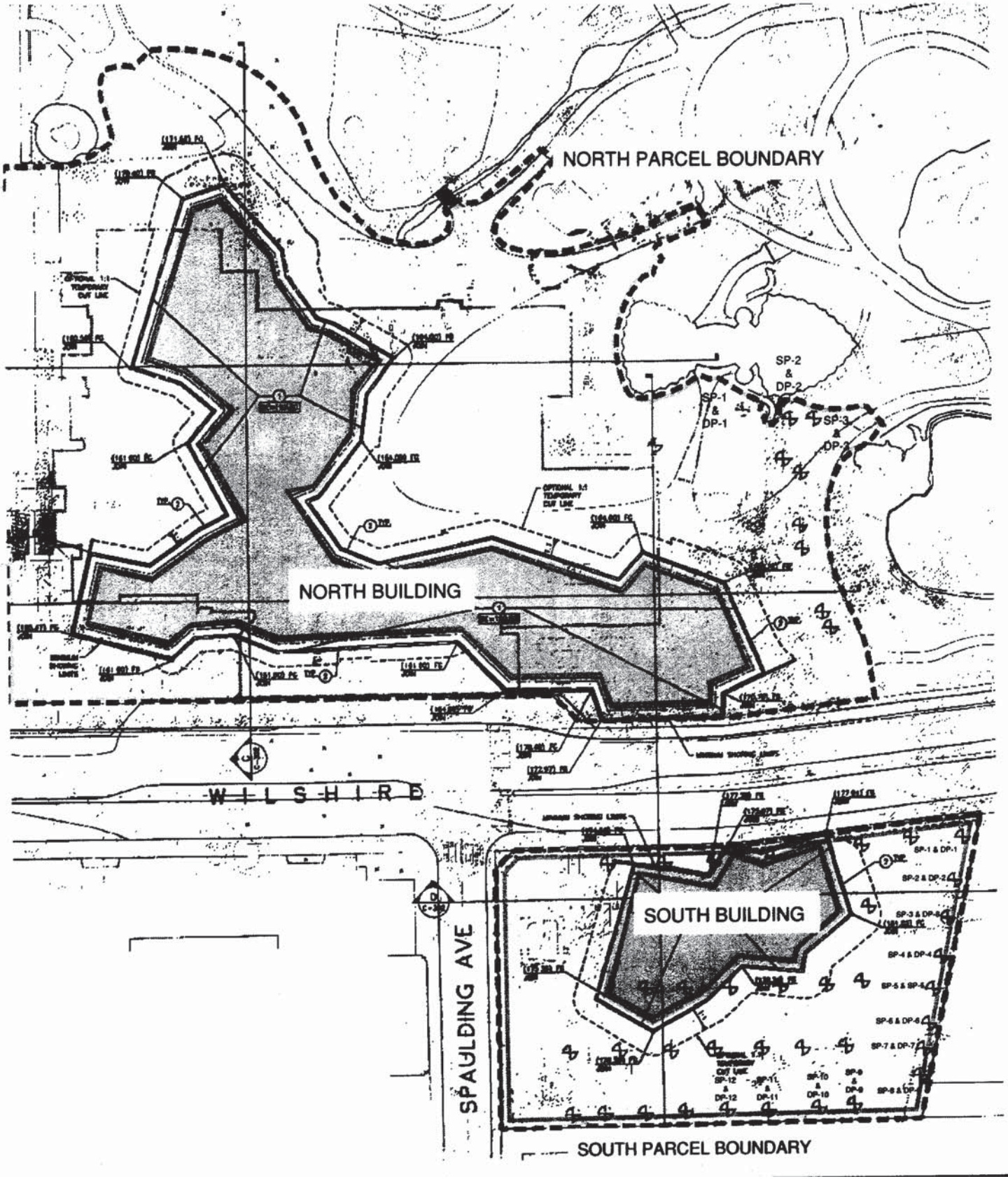
5. OTHER PARCEL RELATED INFORMATION:

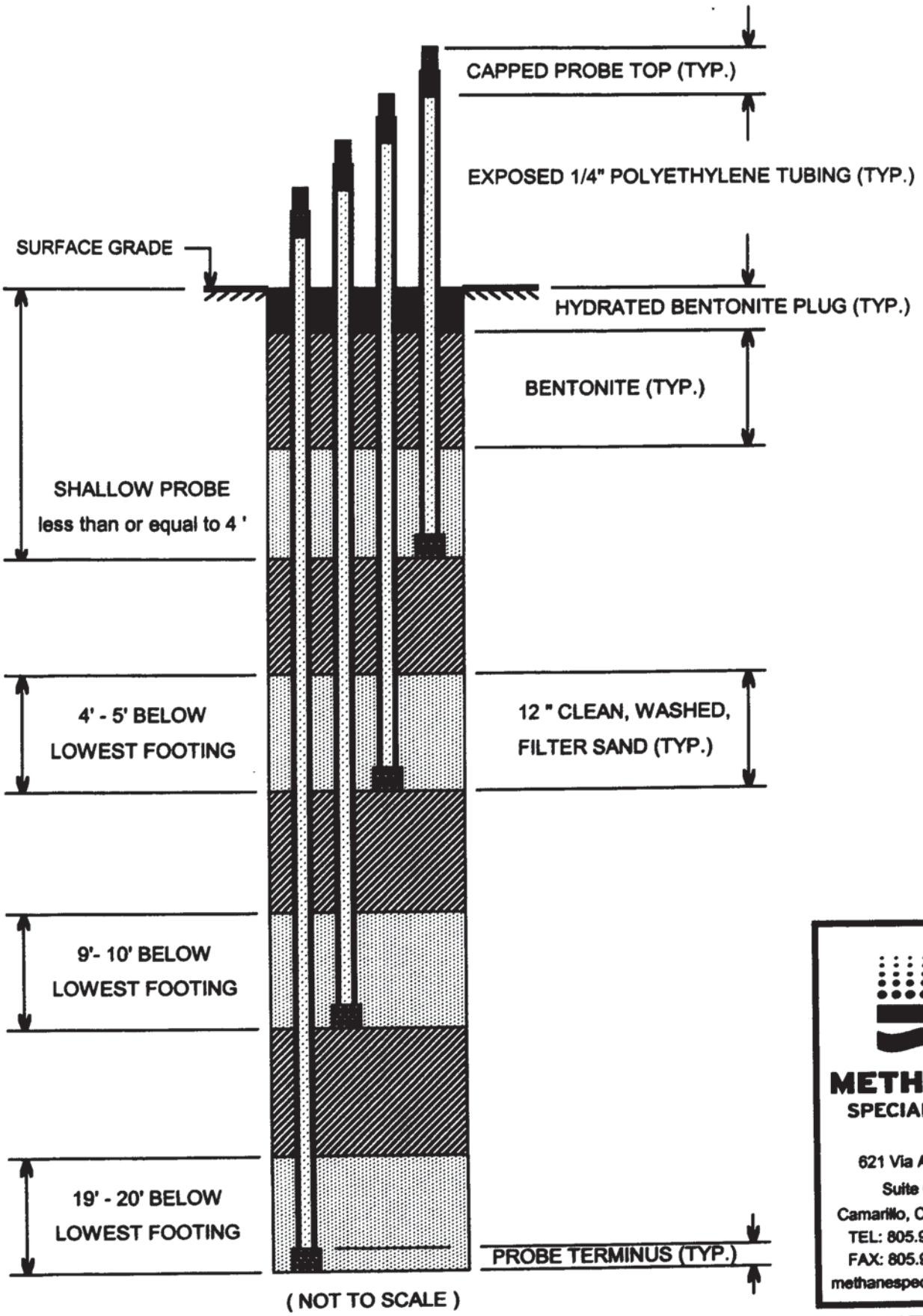
Seismic Gas Shut Off Valve Installed:	5905 W WILSHIRE BLVD

26'-10"
PRELIMINARY
NOT FOR CONSTRUCTION

J3133: 5905 W. WILSHIRE BLVD.

LOS ANGELES, CA 90036





METHANE
SPECIALISTS

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TEL: 805.987.5356
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methanespecialists.com

TEMPORARY MULTI-STAGE GAS MONITORING PROBES FOR METHANE

FORM 1 (CONTINUED) - CERTIFICATE OF COMPLIANCE FOR METHANE TEST DATA P/BC 2014-101

Part 2: Test Data - Shallow Soil Gas Test and Gas Probe Test

Site Address: ***5905 W. Wilshire Blvd., Los Angeles. CA - 90036 - North Bldg*** Job # ***3133***

Description of Gas Analysis Instrument(s):

Instrument Name and Model: ***RKI Eagle*** Instrument Accuracy: ***500*** ppm/v.

City of Los Angeles Testing License #: ***10202*** **Page 1 of 6**

Date	Time	Probe Set#	Stablized CH4 Concentration (ppm/v)	Pressure (inches of water column)	Probe Depth (feet)	Descriptions / Comments : - *Refusal was **not met** @ at any depth of **North** Bldg.* - *Groundwater was **not met** @ any depth*
1 / 27 / 2016	*9:35*	*SP-1*	*44,000*	*< 0.1*	*4*	*88% LEL stable reading with 107.5% LEL peak*
''	*9:25*	*DP-1*	*3,750*	*< 0.1*	*5*	*7% LEL stable reading*
''	*9:20*	*DP-1*	*35,000*	*< 0.1*	*10*	*70% LEL stable reading with 96% LEL peak*
''	***9:15***	***DP-1***	***50,000***	***< 0.1***	***28***	***100% LEL stable reading with O2 as 2% by vol.***
						and maximum reading
''	*10:25*	*SP-2*	*< 500*	*< 0.1*	*4*	
''	*10:20*	*DP-2*	*< 500*	*< 0.1*	*5*	
''	*10:10*	*DP-2*	***50,000***	*< 0.1*	*10*	*100% LEL stable reading*
''	*10:05*	*DP-2*	*44,250*	*< 0.1*	*30*	*88.5% LEL stable reading*
''	*1:15*	*SP-3*	*7,000*	*< 0.1*	*4*	*14.0% LEL stable reading*
''	*1:10*	*DP-3*	*3,500*	*< 0.1*	*5*	*7.0% LEL stable reading*
''	*1:05*	*DP-3*	*6,500*	*< 0.1*	*10*	*13.0% LEL stable reading*
''	*1:00*	*DP-3*	*21,750*	*< 0.1*	*30*	*43.5% LEL stable reading with 200% LEL peak*
1 / 28 / 2016	*7:15*	*SP-1*	***50,000***	*< 0.1*	*4*	*100% LEL stable reading*
''	*7:10*	*DP-1*	*3,500*	*< 0.1*	*5*	*7% LEL stable reading*
''	*7:05*	*DP-1*	*34,500*	*< 0.1*	*10*	*69% LEL stable reading*
''	*7:00*	*DP-1*	*3,750*	*< 0.1*	*28*	*75% LEL stable reading*
''	*7:45*	*SP-2*	*500*	*< 0.1*	*4*	*1% LEL stable reading*
''	*7:40*	*DP-2*	*< 500*	*< 0.1*	*5*	
''	*7:35*	*DP-2*	***50,000***	*< 0.1*	*10*	*100% LEL stable reading*
''	*7:30*	*DP-2*	***50,000***	*< 0.1*	*30*	*100% LEL stable reading*
''	*8:15*	*SP-3*	*6,250*	*< 0.1*	*4*	*12.2% LEL stable reading*
''	*8:10*	*DP-3*	*3,250*	*< 0.1*	*5*	*6.5% LEL stable reading*
''	*8:05*	*DP-3*	*6,500*	*< 0.1*	*10*	*13.0% LEL stable reading*
''	*8:00*	*DP-3*	*20,500*	*< 0.1*	*30*	*41.0% LEL stable reading with 200% LEL peak*

INSTRUMENTATION CALIBRATION RECORD: WATER ENCOUNTERED ? ~~(Y)~~ **(N)** DEPTH: *(see above)*

DATE: _____ TIME: _____ INIT: *R. C.* REFUSAL ? ~~(Y)~~ **(N)** DEPTH: *(see above)*

DATE: _____ TIME: _____ INIT: _____ COMMENTS: *"< 500 ppmv" <=> "Non-Detect" <=> "ND"*

DATE: _____ TIME: _____ INIT: _____ *Tester was Ramon Camacho*

FORM 1 (CONTINUED) - CERTIFICATE OF COMPLIANCE FOR METHANE TEST DATA P/BC 2014-101

Part 2: Test Data - Shallow Soil Gas Test and Gas Probe Test

Site Address: ***5905 W. Wilshire Blvd., Los Angeles. CA - 90036 - South Bldg*** Job # ***3133***

Description of Gas Analysis Instrument(s):

Instrument Name and Model: ***RKI Eagle*** Instrument Accuracy: ***500*** ppm/v.

City of Los Angeles Testing License #: ***10202***

Date	Time	Probe Set#	Stablized CH4 Concentration (ppm/v)	Pressure (inches of water column)	Probe Depth (feet)	Descriptions / Comments : - *Refusal was **met** @ various depths, of **South** Bldg.* - *Groundwater was **not met** @ any depth of any probe*
12 / 06 / 2015	*12:45*	*SP-1*	*< 500*	*< 0.1*	*4*	
"	*12:40*	*DP-1*	*< 500*	*< 0.1*	*5*	
"	*12:35*	*DP-1*	*< 500*	*< 0.1*	*10*	
"	*12:30*	*DP-1*	***2,000***	*< 0.1*	*28*	*4.0% LEL stable reading*
"	*1:20*	*SP-2*	*< 500*	*< 0.1*	*4*	
"	*1:15*	*DP-2*	*< 500*	*< 0.1*	*5*	
"	*1:10*	*DP-2*	*< 500*	*< 0.1*	*10*	
"	*1:00*	*DP-2*	***1,000***	*< 0.1*	*28*	*2.0% LEL stable reading*
"	*2:00*	*SP-3*	*< 500*	*< 0.1*	*4*	
"	*1:50*	*DP-3*	*< 500*	*< 0.1*	*5*	
"	*1:45*	*DP-3*	*< 500*	*< 0.1*	*10*	
"	*1:40*	*DP-3*	*< 500*	*< 0.1*	*28*	
12 / 23 / 2015	*8:55*	*SP-4*	***14,250***	*< 0.1*	*4*	*28.5% LEL stable reading*
"	*8:50*	*DP-4*	***8,500***	*< 0.1*	*5*	*17% LEL stable reading*
"	*8:45*	*DP-4*	***11,500***	*< 0.1*	*10*	*23.0% LEL stable reading*
"	*8:40*	*DP-4*	***38,500***	*< 0.1*	*20*	*77.0% LEL stable reading and met refusal*
"	*9:55*	*SP-5*	***48,250***	*< 0.1*	*4*	*96.5% LEL stable reading*
"	***9:50***	***DP-5***	***50,000***	***< 0.1***	***5***	***100% LEL stable reading & maximum reading***
"	*9:45*	*DP-5*	***50,000***	*< 0.1*	*10*	*100% LEL stable reading*
"	*9:40*	*DP-5*	***50,000***	*< 0.1*	*24*	*100% LEL stable reading and met refusal*
"	*10:45*	*SP-6*	***27,500***	*< 0.1*	*4*	*55.0% LEL stable reading*
"	*10:40*	*DP-6*	***24,500***	*< 0.1*	*5*	*49.0% LEL stable reading*
"	*10:35*	*DP-6*	***38,500***	*< 0.1*	*10*	*79.0% LEL stable reading*
"	*10:30*	*DP-6*	***50,000***	*< 0.1*	*28*	*100% LEL stable reading*
"	*12:00*	*SP-7*	***3,500***	*< 0.1*	*4*	*7.0% LEL stable reading*
"	*11:55*	*DP-7*	***46,250***	*< 0.1*	*5*	*92.5% LEL stable reading*
"	*11:50*	*DP-7*	***32,750***	*< 0.1*	*10*	*65.5% LEL stable reading*
"	*11:45*	*DP-7*	***47,250***	*< 0.1*	*28*	*94.5% LEL stable reading*
"	*12:27*	*SP-8*	***4,000***	*< 0.1*	*4*	*8.0% LEL stable reading*
"	*12:22*	*DP-8*	***3,750***	*< 0.1*	*5*	*7.5% LEL stable reading*
"	*12:17*	*DP-8*	***10,000***	*< 0.1*	*10*	*20.0% LEL stable reading*
"	*12:12*	*DP-8*	***43,000***	*< 0.1*	*30*	*86.0% LEL stable reading*

INSTRUMENTATION CALIBRATION RECORD: WATER ENCOUNTERED ? ~~(Y)~~ (N) DEPTH: *(see above)*

DATE: _____ TIME: _____ INIT: *R. C.* REFUSAL ? (Y) ~~(N)~~ DEPTH: *(see above)*

DATE: _____ TIME: _____ INIT: _____ COMMENTS: *"< 500 ppmv" <=> "Non-Detect" <=> "ND"*

DATE: _____ TIME: _____ INIT: _____ *Tester was Ramon Camacho*

FORM 1 (CONTINUED) - CERTIFICATE OF COMPLIANCE FOR METHANE TEST DATA P/BC 2014-101

Part 2: Test Data - Shallow Soil Gas Test and Gas Probe Test

Site Address: ***5905 W. Wilshire Blvd., Los Angeles. CA - 90036 - South Bldg*** Job # ***3133***

Description of Gas Analysis Instrument(s):

Instrument Name and Model: ***RKI Eagle*** Instrument Accuracy: ***500*** ppm/v.

City of Los Angeles Testing License #: ***10202***

Date	Time	Probe Set#	Stablized CH4 Concentration (ppm/v)	Pressure (inches of water column)	Probe Depth (feet)	Descriptions / Comments : - *Refusal was **met** @ various depths of **South** Bldg.* - *Groundwater was **not met** @ any depth of any probe*
12 / 23 / 2015	*1:05*	*SP-9*	***50,000***	*< 0.1*	*4*	*100.0% LEL stable reading*
''	*1:00*	*DP-9*	***50,000***	*< 0.1*	*5*	*100.0% LEL stable reading*
''	*12:55*	*DP-9*	***50,000***	*< 0.1*	*10*	*100.0% LEL stable reading*
''	*12:50*	*DP-9*	***50,000***	*< 0.1*	*30*	*100.0% LEL stable reading*
''	*1:20*	*SP-10*	***3,250***	*< 0.1*	*4*	*20.0% LEL stable reading*
''	*1:15*	*DP-10*	***16,750***	*< 0.1*	*5*	*19.0% LEL stable reading*
''	*1:10*	*DP-10*	***50,000***	*< 0.1*	*10*	*20.5% LEL stable reading*
''	*1:00*	*DP-10*	***50,000***	*< 0.1*	*30*	*21.5% LEL stable reading*
''	*2:53*	*SP-11*	***3,250***	*< 0.1*	*4*	*6.5% LEL stable reading*
''	*2:48*	*DP-11*	***16,750***	*< 0.1*	*5*	*31.5% LEL stable reading*
''	*2:43*	*DP-11*	***50,000***	*< 0.1*	*10*	*100.0% LEL stable reading*
''	*2:38*	*DP-11*	***50,000***	*< 0.1*	*28*	*100.0% LEL stable reading*
''	*3:30*	*SP-12*	***36,250***	*< 0.1*	*4*	*72.5% LEL stable reading*
''	*3:25*	*DP-12*	***36,750***	*< 0.1*	*5*	*73.5% LEL stable reading*
''	*3:20*	*DP-12*	***50,000***	*< 0.1*	*10*	*100.0% LEL stable reading*
''	*3:15*	*DP-12*	***50,000***	*< 0.1*	*28*	*100.0% LEL stable reading*

INSTRUMENTATION CALIBRATION RECORD:

WATER ENCOUNTERED ? ~~(Y)~~ (N) DEPTH: *(see above)*

DATE: _____ TIME: _____ INIT: *R. C.* REFUSAL ? (Y) ~~(N)~~ DEPTH: *(see above)*

DATE: _____ TIME: _____ INIT: _____ COMMENTS: *"< 500 ppmv" <=> "Non-Detect" <=> "ND"*

DATE: _____ TIME: _____ INIT: _____ *Tester was Ramon Camacho*

FORM 1 (CONTINUED) - CERTIFICATE OF COMPLIANCE FOR METHANE TEST DATA P/BC 2014-101

Part 2: Test Data - Shallow Soil Gas Test and Gas Probe Test

Site Address: ***5905 W. Wilshire Blvd., Los Angeles. CA - 90036 - South Bldg*** Job # ***3133***

Description of Gas Analysis Instrument(s):

Instrument Name and Model: ***RKI Eagle*** Instrument Accuracy: ***500*** ppm/v.

City of Los Angeles Testing License #: ***10202*** **Page 4 of 6**

Date	Time	Probe Set#	Stablized CH4 Concentration (ppm/v)	Pressure (inches of water column)	Probe Depth (feet)	Descriptions / Comments : - *Refusal was **met** @ various depths of **South** Bldg.* - *Groundwater was **not met** @ any depth of any probe*
12 / 7 / 2016	8:20	SP-1	< 500	< 0.1	4	
"	8:15	DP-1	< 500	< 0.1	5	
"	8:05	DP-1	< 500	< 0.1	10	
"	8:00	DP-1	< 500	< 0.1	28	
"	8:45	SP-2	< 500	< 0.1	4	
"	8:40	DP-2	< 500	< 0.1	5	
"	8:35	DP-2	< 500	< 0.1	10	
"	8:30	DP-2	< 500	< 0.1	28	
"	9:15	SP-3	< 500	< 0.1	4	
"	9:10	DP-3	< 500	< 0.1	5	
"	9:05	DP-3	< 500	< 0.1	10	
"	9:00	DP-3	< 500	< 0.1	28	
12 / **24** / 2015	8:20	SP-4	**18,250**	< 0.1	4	37.5% LEL stable reading & 151.5% LEL reading
"	8:15	DP-4	**10,750**	< 0.1	5	21.5% LEL stable reading & 138.0% LEL reading
"	8:10	DP-4	**10,750**	< 0.1	10	21.5% LEL stable reading & 153.0% LEL reading
"	8:00	DP-4	---	---	20	Low Flow
"	8:50	SP-5	**50,000**	< 0.1	4	100% LEL stable reading
"	8:45	DP-5	**50,000**	< 0.1	5	100% LEL stable reading
"	8:40	DP-5	**50,000**	< 0.1	10	100% LEL stable reading
"	8:30	DP-5	**50,000**	< 0.1	24	100% LEL stable reading
"	9:20	SP-6	**12,000**	< 0.1	4	24.0% LEL stable reading
"	9:15	DP-6	**10,500**	< 0.1	5	21.0% LEL stable reading
"	9:05	DP-6	**23,500**	< 0.1	10	47,0% LEL stable reading
"	9:00	DP-6	**50,000**	< 0.1	28	100% LEL stable reading
"	9:50	SP-7	**7,750**	< 0.1	4	15.5% LEL stable reading
"	9:45	DP-7	**44,000**	< 0.1	5	88.0% LEL stable reading
"	9:35	DP-7	**23,500**	< 0.1	10	47.0% LEL stable reading
"	9:30	DP-7	---	---	28	Low Flow
"	10:20	SP-8	**2,500**	< 0.1	4	5.0% LEL stable reading
"	10:15	DP-8	**13,250**	< 0.1	5	26.5% LEL stable reading
"	10:05	DP-8	**4,000**	< 0.1	10	8.0% LEL stable reading
"	10:00	DP-8	**10,000**	< 0.1	30	20.0% LEL stable reading

INSTRUMENTATION CALIBRATION RECORD: WATER ENCOUNTERED ? ~~(Y)~~ (N) DEPTH: *(see above)*

DATE: _____ TIME: _____ INIT: *R. C.* REFUSAL ? (Y) ~~(N)~~ DEPTH: *(see above)*

DATE: _____ TIME: _____ INIT: _____ COMMENTS: *"< 500 ppmv" <=> "Non-Detect" <=> "ND"*

DATE: _____ TIME: _____ INIT: _____ *Tester was Ramon Camacho*

FORM 1 (CONTINUED) - CERTIFICATE OF COMPLIANCE FOR METHANE TEST DATA P/BC 2014-101

Part 2: Test Data - Shallow Soil Gas Test and Gas Probe Test

Site Address: ***5905 W. Wilshire Blvd., Los Angeles. CA - 90036 - South Bldg*** Job # ***3133***

Description of Gas Analysis Instrument(s):

Instrument Name and Model: ***RKI Eagle*** Instrument Accuracy: ***500*** ppm/v.

City of Los Angeles Testing License #: ***10202*** **Page 5 of 6**

Date	Time	Probe Set#	Stablized CH4 Concentration (ppm/v)	Pressure (inches of water column)	Probe Depth (feet)	Descriptions / Comments : - *Refusal was **met** @ various depths of **South** Bldg.* - *Groundwater was **not met** @ any depth of any probe*
12 / 24 / 2015	10:50	SP-9	**3,750**	< 0.1	4	7.5% LEL stable reading
"	10:45	DP-9	**3,750**	< 0.1	5	7.5% LEL stable reading
"	10:35	DP-9	**50,000**	< 0.1	10	100% LEL stable reading
"	10:30	DP-9	---	---	30	Low Flow
12 / 25 / 2015	10:10	SP-10	**50,000**	< 0.1	4	15.0% LEL stable reading
"	9:55	DP-10	**50,000**	< 0.1	5	15.0% LEL stable reading
"	9:50	DP-10	**50,000**	< 0.1	10	14.0% LEL stable reading
"	9:40	DP-10	**50,000**	< 0.1	30	15.5% LEL stable reading
"	10:55	SP-11	**12,000**	< 0.1	4	2.0% LEL stable reading
"	10:45	DP-11	**10,500**	< 0.1	5	2.0% LEL stable reading
"	10:40	DP-11	**50,000**	< 0.1	10	100% LEL stable reading
"	10:30	DP-11	**50,000**	< 0.1	28	100% LEL stable reading
"	11:35	SP-12	**50,000**	< 0.1	4	100% LEL stable reading
"	11:30	DP-12	**50,000**	< 0.1	5	100% LEL stable reading
"	11:20	DP-12	**50,000**	< 0.1	10	100% LEL stable reading
"	11:15	DP-12	**38,500**	< 0.1	28	77.0% LEL stable reading

INSTRUMENTATION CALIBRATION RECORD: WATER ENCOUNTERED ? ~~(Y)~~ (N) DEPTH: ***(see above)***

DATE: _____ TIME: _____ INIT: *R. C.* REFUSAL ? (Y) ~~(N)~~ DEPTH: ***(see above)***

DATE: _____ TIME: _____ INIT: _____ COMMENTS: *"< 500 ppmv" <=> "Non-Detect" <=> "ND"*

DATE: _____ TIME: _____ INIT: _____ *Tester was Ramon Camacho*

TABLE 1A - MITIGATION REQUIREMENTS FOR METHANE ZONE

SITE DESIGN LEVEL			LEVEL I		LEVEL II		LEVEL III		LEVEL IV		LEVEL V
DESIGN METHANE CONCENTRATION (ppm/v)			0 - 100		101 - 1,000		1,001 - 5,000		5,001 - 12,500		>12,500
DESIGN METHANE PRESSURE (inches of water column)			≤2"	>2"	≤2"	>2"	≤2"	>2"	≤2"	>2"	ALL PRESSURES
PASSIVE SYSTEM	DE-WATERING SYSTEM *		X*	X*	X*	X*	X*	X*	X*	X*	X*
	SUB-SLAB VENT SYSTEM	PERFORATED HORIZONTAL PIPES	X	X	X	X	X	X	X	X	X
		GRAVEL BLANKET UNDER MEMBRANE	2"	2"	2"	3"	2"	3"	2"	4"	4"
		GRAVEL THICKNESS SURROUNDING PIPES	2"	2"	2"	3"	2"	3"	2"	4"	4"
		VENT RISERS +	X+	X+	X+	X+	X+	X+	X+	X+	X+
	IMPERVIOUS MEMBRANE		X	X	X	X	X	X	X	X	X
ACTIVE SYSTEM	SUB-SLAB VENT SYSTEM	MECHANICAL EXTRACTION SYSTEM +								X+	X+
	LOWEST OCCUPIED SPACE SYSTEM	GAS DETECTION SYSTEM				X	X	X	X	X	X
		MECHANICAL VENTILATION SYSTEM		X		X	X	X	X	X	X
		ALARM SYSTEM		X		X	X	X	X	X	X
	CONTROL PANEL			X		X	X	X	X	X	X
MISC. SYSTEM	TRENCH DAM		X	X	X	X	X	X	X	X	X
	CONDUIT OR CABLE SEAL FITTINGS		X	X	X	X	X	X	X	X	X
	ADDITIONAL VENT RISERS +										X+

X => Required, as per the Methane Code of the City of Los Angeles.

* => De-Watering not required when the maximum historical high groundwater table elevation, or projected post-construction groundwater level, is more than twelve inches below the bottom of the perforated horizontal pipes.

+ => Vent risers maximum spacing shall be less than, or equal to, 100 Linear Feet, measured between vent risers.

FORM 1 - CERTIFICATE OF COMPLIANCE FOR METHANE TEST DATA

P/BC 2014-101

Part 1: Certification Sheet

Site Address: ***5905 W. Wilshire Blvd., Los Angeles. CA - 90036*** Job No. **3133**

Legal Description: Tract: ***Tr. 215*** Lot: ***12*** Block: ***(unnumbered)***

Building Use: ***New ''400,000 SF commercial building'' with ''one subterranean basement level''***

Name of Architect, Engineer, or Geologist: ***Kirby N. Arriola, P.E.***	Architect's, Engineer's or Geologist's Stamp
Mailing Address: ***Methane Specialists 621 Via Alondra, # 610 Camarillo, CA - 93012***	
Telephone: ***(805) 987-5356***	
Name of Testing Laboratory: ***Methane Specialists***	
City Test Lab License #: ***10202***	
Telephone: ***(805) 987-5356***	

I hereby certify that I have tested the above site for the purposes of methane mitigation and that all procedures were conducted by a City of Los Angeles licensed testing agency in conformity with the requirements of the LADBS Information Bulletin P/BC 2002-101. Where the inspection and testing of all or part of the work above is delegated, full responsibility shall be assumed by the architect, engineer or geologist whose signature is affixed hereon.

Signed: _____ Date: _____

Required Data:

* Project is ~~in the~~ (***Methane Zone***) ~~or~~ (~~Methane Buffer Zone~~)
* Depth of Groundwater observed during testing: ***> 28 '*** ***below*** the Impervious Membrane ***(~0' below surface grade)***
* Depth of Historical High Ground Water Table Elevation*: ***> 28 '*** ***below*** the Impervious Membrane ***(~ 0' bsg)***
* Design Methane Concentration**: ***> 50,000*** parts per million in volume (ppm/v). ***(i.e.: 100% LEL)***
* Design Methane Pressure Value***: ***< 0.1*** inches of water column.
* Site Design Level: (~~Level I~~, ~~Level II~~, ~~Level III~~, ~~Level IV~~, ***Level V***) with ***< 2.0*** inches of water column

Dewatering:

* Dewatering (~~is~~) (**is not**) required for methane mitigation per Section 91.7104.3.7.**(subject to Final Geotech Report)**
* Pump discharge rate ***not provided*** cubic-feet-per-minute per reference geology or soil report:

_____ dated _____

Additional Investigation:

* Additional Investigation (~~was~~) (***was not***) conducted. ***(by Methane Specialists)***

Latest Grading on Site:

* Date of last grading on site (***was***) (~~was not~~) more than 30 days before Site Testing.

Notes:

* Historical High Ground Water Table Elevation shall mean the highest recorded elevation of ground water based on historical records and field investigations as determined by the engineer for the methane mitigation system.
** Design Methane Concentration shall mean the highest recorded measured methane concentration from either Shallow Soil Gas Test or any Probe Set on the site.
*** Design Methane Pressure shall mean the highest total pressure measured for any Gas Probe Set on the site.

Exhibit 4 Project Site DOGGR Map

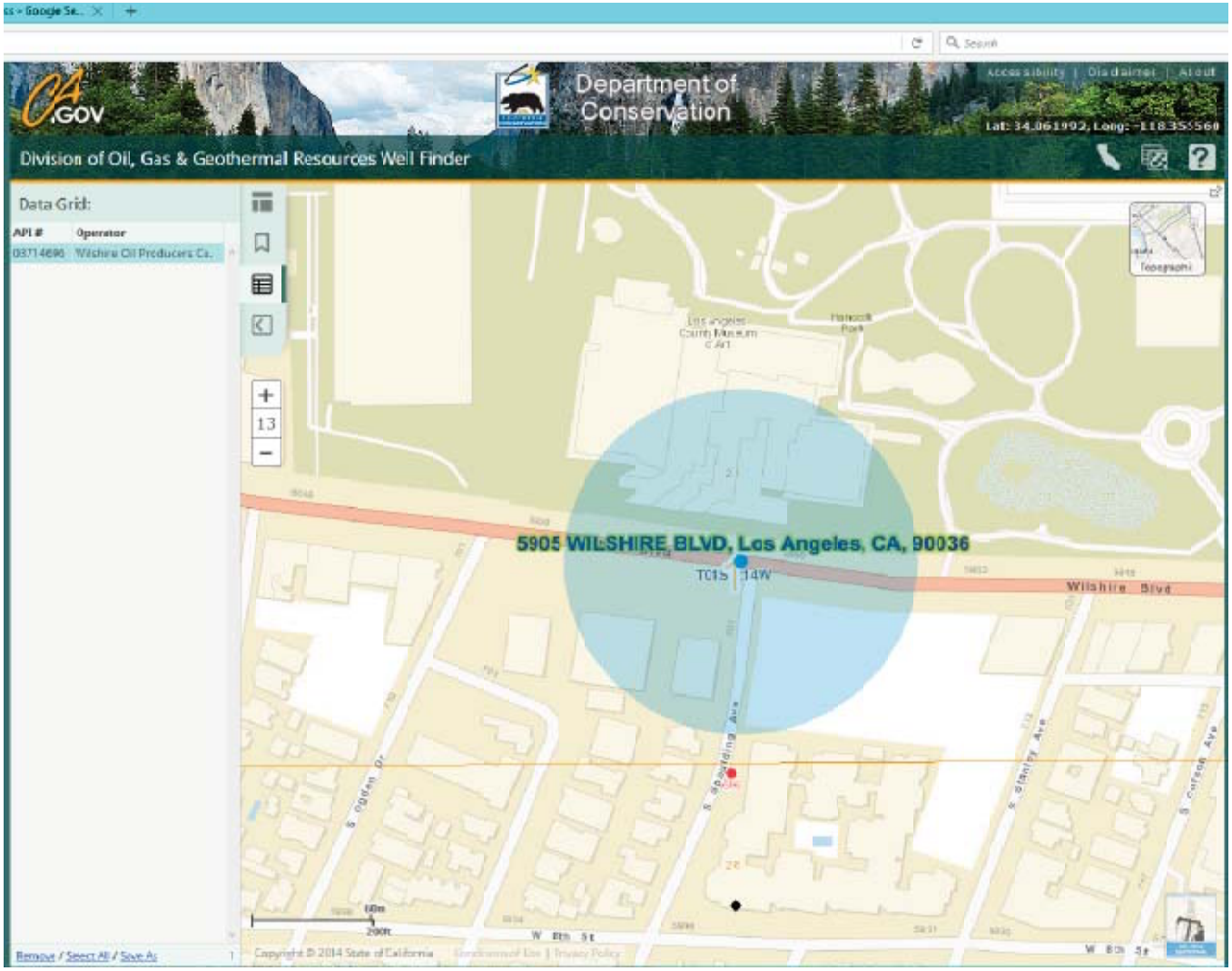

Department of Conservation
Division of Oil, Gas & Geothermal Resources Well Finder
Data Grid:
API #
Operator
03714696
Wilshire Oil Producers Co.
5905 WILSHIRE BLVD, Los Angeles, CA, 90036
T01S | 14W
Wilshire Blvd
S Ogden Dr
S Spaulding Ave
S Stanley Ave
S Curson Ave
W 8th St
Remove / Select All / Save As

Exhibit 5 Methane Zone Map

Anita- D:\home\z88ew\jrequests\aug03\r1311\r1311_combined_methane&methane_buffer_zones

BASIC GRID MAP

CITY OF LOS ANGELES

BUREAU OF ENGINEERING

Ordinance 175,790

JAMES K. HAHN
MAYOR

Methane Zone
Methane Buffer Zone
Council District Boundary

METHANE AND METHANE BUFFER ZONES

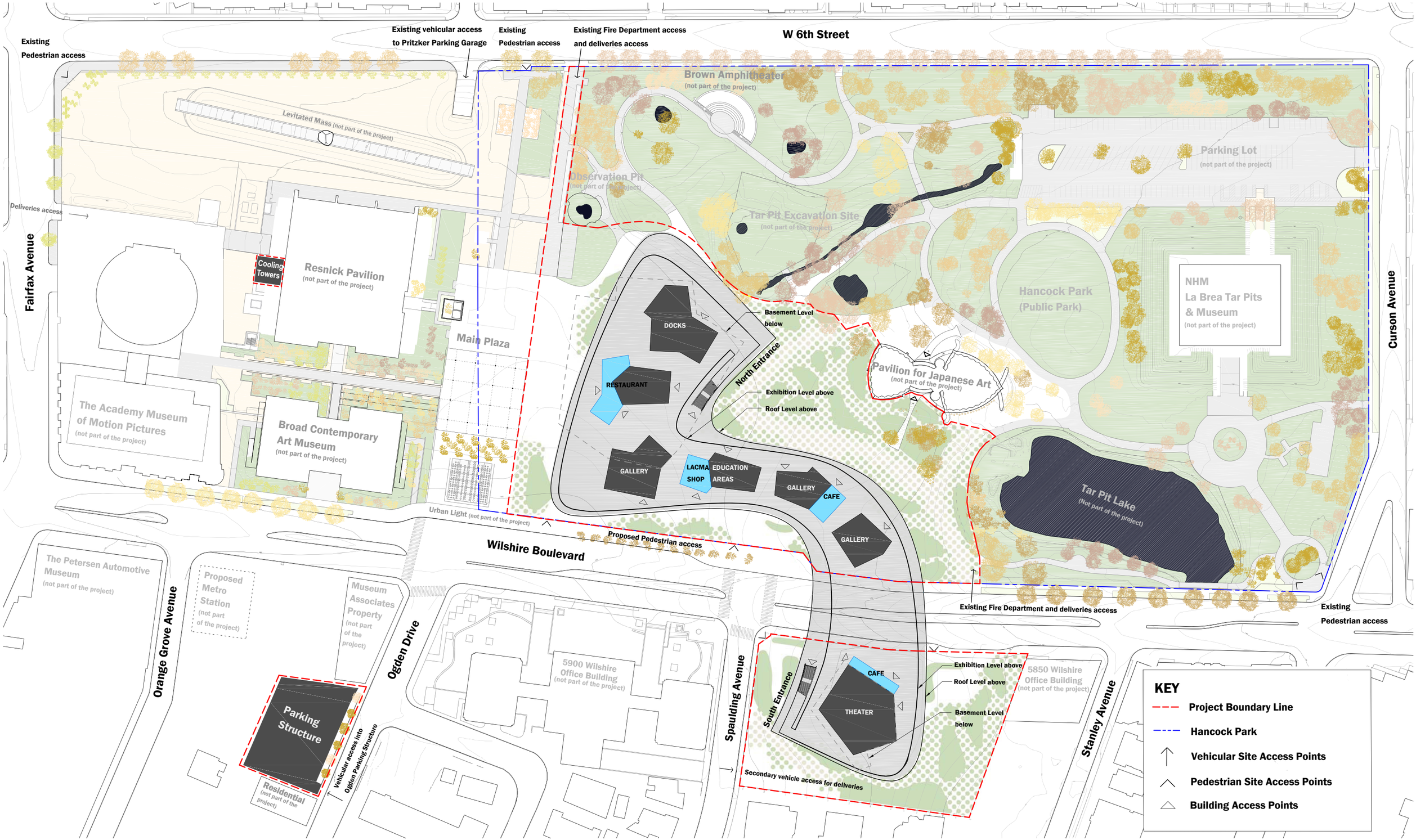
CITY OF LOS ANGELES

Prepared by GIS Mapping, Bureau of Engineering, Dept. of Public Works - 03/31/04

N

GARY LEE MOORE, P.E.
CITY ENGINEER

Exhibit 6 Conceptual Site Plan



Los Angeles County Museum of Art
Building for the Permanent Collection,
Los Angeles, California

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CONCEPTUAL PLAN AT GROUND LEVEL

Los Angeles County Museum of Art
Building for the Permanent Collection,
Los Angeles, California

JULY 2017